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When They Taxed Sunlight

DURING the 17th Century in England the poor were forced further to reduce available sunshine by boarding up taxable windows and skylights . . . Even with today's windows untaxed, modern physicians do not depend entirely upon the sun to meet vitamin D needs in infants and children. A great number of medical men assure adequate intake of both vitamins A and D by supplementing diets of the young with

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The Journal of Pediatrics

VOL. 25 OCTOBER, 1944 NO. 4

Original Communications

RUBELLA EARLY IN PREGNANCY CAUSING CONGENITAL MALFORMATIONS OF EYES AND HEART

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NEW light has recently been thrown on the etiologic factors involved in certain congenital malformations by three series of cases which have been reported from Australia, in which virus infections, particularly German measles (rubella), occurring early in pregnancy seem to be definitely related to the congenital defects. In 1941 Gregg[1] reported a series of 78 cases of congenital cataract, 44 of them also having congenital heart disease, occurring in infants whose mothers, with few exceptions, had suffered during the early months of pregnancy from an exanthematous disease diagnosed as rubella. In a recent article Swan[2] and co-workers confirmed the findings of this earlier study and investigated other defects that might develop when rubella occurred early in pregnancy. They reported a total of 49 cases of rubella during all stages of pregnancy of which 25 occurred in the first two months. Every one of these 25 early cases showed congenital defects in the infant usually of the eye or heart, while in the third month 50 per cent showed defects (4 out of 8). Beyond the third month of pregnancy only 2 out of 16 showed defects. Of the 31 congenital malformations there were 17 congenital heart lesions, 14 congenital defects of the eye, 7 deaf mutes, 1 Mongoloid idiot and several cases each of microcephaly, hypospadias and mental retardation. In many infants there were several malformations. In a follow-up paper Swan[4] and co-workers reported 10 more cases of congenital malformations occurring in infants born of mothers who suffered from rubella early in pregnancy. Reese,[5] in the only American reference on the subject, reported 3 cases of congenital cataract and congenital heart disease occurring in mothers who had contracted rubella early in pregnancy.

The present report includes 11 cases, which, while not large, should serve to stimulate a greater interest in this subject in this country. (Table I.)

TABLE I

CASE	SEX	BIRTH DATE	DURATION OF PREGNANCY AT ONSET OF RUBELLA	CONGENITAL EYE DEFECTS	CONGENITAL HEART DEFECTS	OTHER DEFECTS
1	F	2/10/43	2 weeks	Bilateral cataracts	Yes	Possible mental retardation
2	M	12/10/42	4 weeks	Bilateral cataracts	Yes	Mental retardation
3	M	10/26/43	3 weeks	Left cataract with microphthalmia	Yes	
4	M	11/14/43	3 weeks	Bilateral cataracts	No	Severe anemia resembling erythroblastosis fetalis
5	M	12/14/43	2½ weeks	Left cataract with microphthalmia	Yes	
6	F	12/15/43	2½ weeks	Right microphthalmia	Yes	
7	F	12/16/43	4 weeks	Bilateral cataracts	No	
8	M	10/15/43	2½ months	Right corneal opacity with microphthalmia	Yes	
9		11/ 4/43	2 weeks	Bilateral Cataracts	Yes	
10		2/20/44	2 months	Bilateral Cataracts	Yes	
11		12/17/42	1 month	Bilateral Cataracts	Yes	

Most of the babies were small and had considerable feeding difficulties. None of the babies were cyanotic and their cardiac physical findings made it seem likely that the defect was a patent interventricular septum. In no case was there a family history of congenital eye or cardiac anomalies.

Data concerning Case 2 were furnished by Dr. Walter Rogers, and Case 7, by Dr. Robert Cleland, both of Pasadena, Calif.; Case 8, by Dr. Hugh Berkley of Beverly Hills, Calif.; Cases 9 and 10, by Dr. E. Earl Moody of Los Angeles; and Case 11, by Dr. David B. Davis of Beverly Hills, Calif.

EMBRYOLOGY[3]

At three or four weeks the embryo is about 2 mm. in length and at this time a lens placode develops from the ectoderm which soon invaginates to form the lens vesicle. By 5½ weeks (8 mm. embryo) the lens lies free from both the surface ectoderm and the optic cup which has formed from the neural tube. The inner cells of the lens vesicle increase in height and obliterate its cavity by 7 weeks (17 mm. embryo) while the outer cells form the lens capsule.

The mammalian heart arises from two halves which secondarily unite. In an embryo of 6 weeks (10 mm.) the heart exhibits the general external shape and markings that characterize it permanently. The interventricular septum is formed at approximately 7 weeks and is about the last development to take place in the embryonic heart. The interauricular septum (foramen ovale) remains partially open until after birth.

COMMENT

Thus, it is seen that important developmental changes are taking place in the eyes and heart early in fetal life and this coincides well with the occurrence of rubella in these mothers. It is well known that embryonic tissues are particularly susceptible to virus infections, this fact being made use of in the culture of viruses on chick embryos, etc. It is conceivable that because of the smaller size of the filterable virus it may pass the barrier of the chorionic villi more readily than larger infectious agents such as bacteria. Thus it seems plausible that a woman might have a mild systemic infection such as rubella, not be seriously ill herself, and yet have serious injury occur to the developing fetus. It is postulated by Swan[2] that possibly the more severe virus infections such as true measles (morbilli) may kill the fetus and cause an abortion, while rubella merely injures it and thus produces a malformation. It is true, of course, that not all eye and heart malformations are caused by rubella, but increased observation may incriminate other virus infections. However, many congenital malformations will undoubtedly remain which will be unexplainable.

Many practical problems arise from this new knowledge. Girls should not be allowed to pass through childhood without having had rubella—a deliberate exposure at an opportune time would seem wise. The possibility of using convalescent serum for all women who are early in pregnancy and have not had rubella should be considered, particularly after exposure or during an epidemic. The justification for therapeutic abortion, if rubella occurs during the first two months of pregnancy, should be debated, since according to Swan's figures and our own impression, 100 per cent of such babies will have serious congenital malformations. Finally, the possibility of producing similar malformations in experimental animals using different viruses extending throughout the entire period of gestation would seem to offer great promise of advancing our knowledge in this field.

CONCLUSION

Rubella occurring early in pregnancy may lead to congenital malformations in the infant, especially of the eye and heart. Eleven such cases are reported.

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THE DIAGNOSIS OF FIBROCYSTIC DISEASE OF THE PANCREAS

Based Upon Twenty-Six Proved Cases

H. F. Philipsborn, Jr., M.D., G. Lawrence, B.S., and K. C. Lewis, M.D.
Chicago, Ill.

FIBROCYSTIC disease of the pancreas has been recognized only recently[1] although medical writers since the time of Caelius Aurelianus[2] and Aretaeus[3] have repeatedly discussed various forms of chronic intestinal indigestion. It was not until 1888 that a syndrome was clearly separated from this large group. At that time Gee[4] described celiac disease, and in the following year Gibbons[5] added several cases and postulated that celiac disease and sprue were entirely different conditions. In 1902 Bramwell[6] reported a case of "infantilism" which he attributed to pancreatic insufficiency. Subsequently additional cases[7, 8, 9] were reported as "pancreatic infantilism." Some of these were apparently celiac disease; others were true achylia pancreatica. Passini[10] was among the first to associate pancreatic insufficiency and respiratory tract disease. Recently Andersen[1] presented a number of cases of chronic intestinal indigestion due to pancreatic cystic fibrosis, and an intensive study was redirected toward the steatorrheas with the hope of adding more to our knowledge of their diagnosis and treatment.

This report is concerned with the clinical and pathologic findings in twenty-six proved cases of fibrocystic disease seen at this hospital since 1938. In addition, consideration will be given material from children who have not been autopsied. The conditions of many of the earlier patients were erroneously labeled; some of the patients were thought to have bronchopneumonia; others were considered to be feeding problems. The diagnosis of fibrocystic disease was seldom entertained. Only recently has it been possible to recognize the disease with accuracy. This is understandable in view of its protean manifestations, the brief period physicians have been acquainted with it, and the fact that accurate diagnosis is aided considerably by recent laboratory techniques.

The disease is not uncommon. Pathognomonic lesions have been seen in approximately 3.5 per cent of the patients on whom necropsy has been performed at The Children's Memorial Hospital since attention was drawn to the syndrome.[1]

Fibrocystic disease has its inception in infancy unlike celiac disease which first becomes apparent during childhood. Ordinarily it manifests

From The Children's Memorial Hospital.

Many of these patients were made available for study through the kindness of Drs. C. Anderson Aldrich, Harry H. Boyle, Stanley Gibson, L. Martin Hardy, E. T. McEnery, George F. Munns, John L. Reichert, and Alfred S. Traisman.

Secretin used in these studies was provided through the generosity of Dr. H. Greengard of the Department of Physiology, Northwestern University.

itself in one of three forms: (a) primarily in respiratory difficulty, (b) primarily in gastrointestinal disturbances, and (c) in a combination of both respiratory and intestinal difficulties. The patient is usually under 1 year of age. There is no apparent sex predilection. The mother brings the child to the doctor complaining either of chronic cough and colds or of failure to gain weight in spite of a variety of apparently adequate formulas. One out of every four or five of these patients will have had a sibling who died in childhood of diarrhea, pneumonia, and malnutrition. The parents are well, although they, too, may have had siblings who died under similar circumstances.

Physical examination often reveals a marked degree of emaciation which is more striking when one has seen the enthusiasm with which many of these children eat. The extremities are spindlelike; the abdomen, protuberant. The chest is frequently hyperresonant and the area of cardiac dullness diminished. Auscultation may reveal reduced alveolar air exchange with showers of fine moist and sticky râles throughout the chest. Stools are not necessarily "characteristic" but vary in different individuals and even in the same individual; at one time they may be foul, greasy, and loose; at another time, scybalous, brown, and odorless.

Laboratory examination has done much to facilitate the diagnosis of fibrocystic disease. Studies of vitamin A absorption on blood drawn before and after the administration of 0.1 c.c. oleum percomorphum per pound of body weight have assisted in diagnosis. Patients in whom pancreatic cystic fibrosis existed have had blood vitamin A curves that were under 30 units.

Analysis of duodenal drainage following pancreatic stimulation by intravenous secretin has been diagnostic in the presence of achylia pancreatica. In the cases of fibrocystic disease recently investigated, the duodenal enzymes have been markedly reduced both before and after stimulation of the pancreas; in fact, the total secretory response of the pancreas has been reduced both qualitatively and quantitatively. Unfortunately, the technical difficulties encountered in the study of duodenal drainage limit the value of the procedure as a routine laboratory aid. It is an exhausting experience for an already ill child and should therefore be used only where diagnosis is essential and cannot otherwise be established. A number of years ago Ivy[11] pointed out that the absence or existence of a markedly reduced enzyme concentration in the duodenum following secretin stimulation is significant. The use of secretin as a diagnostic test in fibrocystic disease bears out his earlier opinion that secretin might come to have the same relative merits in the testing of pancreatic secretory function as histamine has in the testing of gastric secretory function.

The pathology of fibrocystic disease has been elaborately described elsewhere.[33] In the twenty-six necropsied cases that are presented, every pancreas had increased intralobular and interlobular connective tissue

as well as dilatation of the ducts. Occasional clusters of lymphocytes were seen in the connective tissue. Many of the dilated ducts contained a hyaline appearing eosinophilic staining material (Fig. 1). The lungs of the majority of the patients contained bronchopneumonic areas and serpiginous abscesses. Emphysema and atelectasis were common; often staphylococcus aureus could be cultured (Fig. 2).. Squamous cell

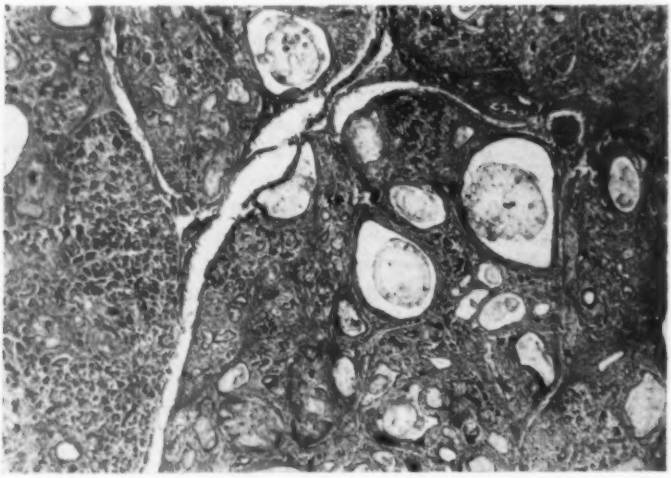

Fig. 1.—Section from the pancreas showing extensive interlobular and intralobular fibrosis as well as the marked cystic dilatation of the intralobular ducts. Note the inspissated material in the latter. (×60.)

Fig. 2.—View of lung with bronchioles. The walls of the latter are intensely infiltrated with polymorphonuclear leucocytes. The lumens are plugged with necrotic debris and acute inflammatory cells. (×90.)

metaplasia was noted in the tracheobronchial trees of numerous patients (Figs. 3 and 4). Fatty changes in the liver were not uncommon (Fig. 5). In two instances early rickets were noted and in two others, kerato-

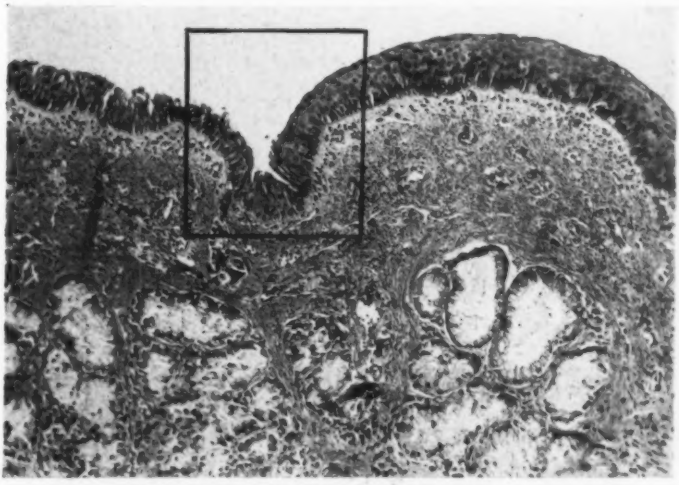

Fig. 3.—A section of the trachea demonstrating metaplastic changes in the epithelial lining. The normal stratified columnar epithelium is on the left of the fold; the squamous cell epithelium is to the right. The boxed-off area is shown in Fig. 4. (×190.)

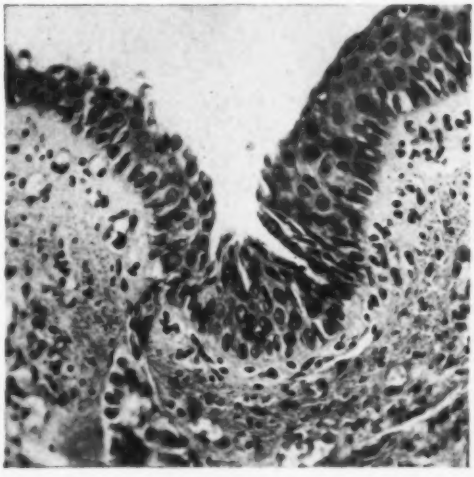

Fig. 4.—Displays the transition of the epithelium to the squamous cell type. (×380.)

malacia. Squamous cell metaplasia, keratomalacia, and rickets are of considerable interest when the metabolism of the fat-soluble vitamins A and D are considered. One is also led to speculate upon the relationship

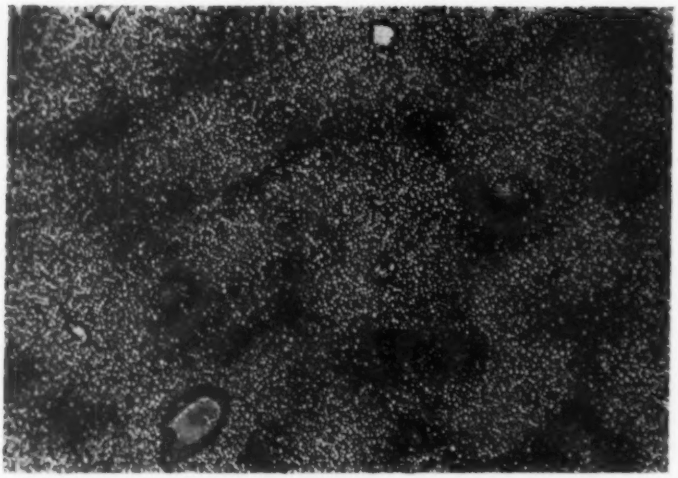

Fig. 5.—Extreme fatty changes in the liver from a case of fibrocystic disease of the pancreas. The usual picture is not so striking. (×75.)

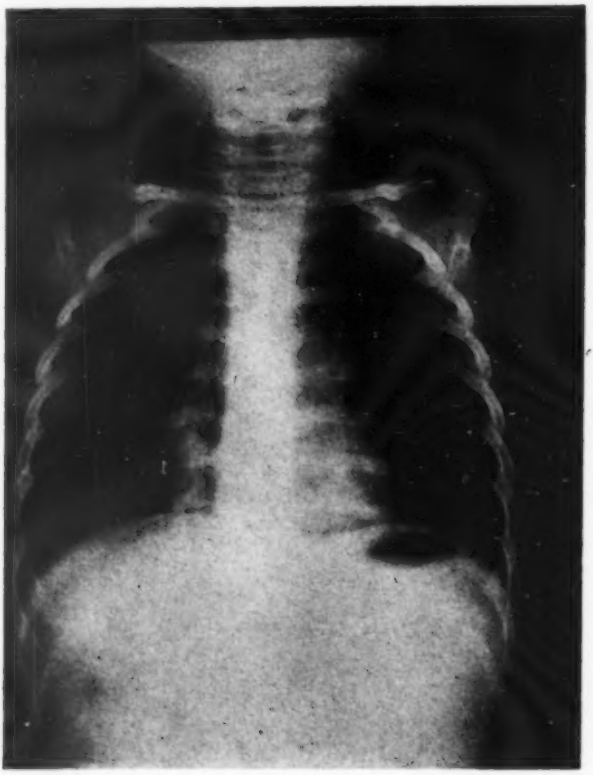

Fig. 6.—Roentgenogram of chest of patient with fibrocystic disease of the pancreas illustrating mottled circumcardiac halo and diffuse soft tissue mottling throughout the lung fields.

between the pancreatic changes, lipocaic, and the frequency with which fatty changes in the liver occurred.[12, 13]

Table I summarizes the experiences with twenty-six proved cases of fibrocystic disease. In many of the patients, laboratory investigations were wholly inadequate; most often stool and vitamin A determinations were omitted. Recently attention has been directed to the quantitative analysis of duodenal enzymes following intravenous secretin.

Ability to diagnose the disease ante mortem has increased with experience and with the knowledge that one is not dealing with an uncommon condition. At the present time clinical experiences are being supplemented with serial studies of stools, vitamin A absorption curves, and duodenal drainage where indicated. Roentgenologic examination has been valuable in diagnosing pulmonary involvement (Fig. 6).

DISCUSSION

Fibrocystic disease is the clinical manifestation of extensive pancreatic cystic fibrosis. In this condition there is a marked reduction of pancreatic enzymes in the intestinal lumen.

In children we have seen an extreme variety of stools; a few of these have been "characteristic," many have been normal, some watery, a few scybalous, and others simply "starvation stools." The many and frequently changing properties of the feces from children having this form of chronic intestinal indigestion have been of interest. It would seem that the fat, consistency, odor, and color of the feces would depend upon variations in the enzymatic and absorptive power of the gastrointestinal mucous membrane as well as the motor activity of the bowel and the type of bacterial flora present.

The symptoms and findings noted in children compare well with those seen in dogs whose external pancreatic secretions are excluded from the bowel. In a large series of such animals Ivy[14] noted that approximately one-third lived and maintained their weight, another third lost weight in spite of polyphagia and were subject to frequent respiratory infections. The remaining animals not only lost weight in spite of polyphagia but also almost invariably died of intercurrent infections. The total stool fat of these animals varied widely as did that of children with fibrocystic disease, apparently for similar reasons.

It has often been stated that in pancreatic steatorrhea the stool is soapy and contains a large amount of unsplit fat.[15] In contradistinction, the stool in idiopathic steatorrhea is supposed to contain an abundance of split fats.[16] These views concerning the steatorrheas have been handed down as a mnemonic device and are apparently based solely upon the physiology of the pancreas rather than upon an understanding of the total secretory, motor, and absorptive activities of the gastro-

TABLE

CASE	SEX	AGE AT TIME OF ONSET	AGE AT TIME OF DEATH	FAMILY HISTORY	GASTROINTESTINAL SYMPTOMS	RESPIRATORY SYMPTOMS
1* (C. M.)	F	2 mo.	9 mo.	1 sibling died by smothering; 6 well siblings; parents well	On adequate diet but weighed only 8 lb., 9 oz. at 9 mo.; from 2 to 8 foul, soft, yellow stools daily	Chronic and progressive cough since croup at age of 2 mo.
2* (D. D.)	M	Birth	3.5 mo.	Only sibling died at 3 mo. of age with diarrhea, foul stools, malnutrition and cough; parents well	On adequate diet but weighed 8 lb., 9 oz. at 3 mo.; dysphagia; frequent large stools	Chronic cough
3* (P. D.)	F	2.5 mo.	3.5 mo.	3 siblings died around 3 mo. of age with cough and malnutrition; 7 siblings well; parents well	On adequate diet; weighed 6 lb., 1 oz. at 3 mo.	Progressively severe cough for 1 month
4* (R. K.)	M	Birth	7 mo.	2 spontaneous miscarriages; one child died at 10 mo. with diarrhea and pneumonia; sibling, aged 5, and parents well	On adequate diet; weighed 11 lb., 3 oz. at 7 mo.; 4 to 5 loose stools daily	Chronic cough and intermittent respiratory infections since birth
5 (L. W.)	M	3 mo.	3.5 mo.	2 siblings and parents well	Weight unknown; breast fed until 1 week before death	Grunting respirations and dyspnea
6 (J. B.)	F	3 mo.	4 mo.	No siblings; parents well	On adequate diet weighed 9 lb., 11 oz. at 3 mo.; constipated	Paroxysms of coughing
7 (S. K.)	M	5 mo.	7.5 mo.	Subsequent male sibling died of typical fibrocystic disease but no necropsy obtained; parents well	On adequate diet weighed 10 lb., 4 oz. at 7 mo.	Cough and dyspnea
8 (J. McG.)	M	Birth	10 mo.	1 sibling dead at 1 month from pneumonia; twin brother, 2 older siblings, and parents well	On adequate diet weighed 10 lb. at 10 mo.; twin brother weighed 15 lb. at 10 mo.	Hacking cough
9 (C. V.)	F	Birth	4 mo.	1 sibling died of acute hepatitis and massive pulmonary hemorrhage; 4 siblings and parents well	On adequate diet weighed 6 lb., 7 oz. at 4 mo.; had diarrhea with large foul stools	Chronic cough
10 (R. W.)	M	2 mo.	5 mo.	No siblings; parents well	On adequate diet weighed 8 lb., 13 oz. at 5 mo.; chronic diarrhea	Chronic cough

*Cases previously reported by Daniels, W. A., Jr.: Am. J. Dis. Child. **64**: 33, 1942.
†Case previously reported by Gamble, R. C.: Am. Journ. Ophthalm. **23**: 539, 1940.
‡Case provided through the courtesy of Dr. L. W. Sauer.
§ indicates the presence of pathologic process.
¶ indicates the absence of pathologic process.

I

PHYSICAL FINDINGS	CYSTIC FIBROSIS OF PANCREAS	LUNG ABSCESSES	LIVER STEATOSIS	SQUAMOUS METAPLASIA OF TRACHEA AND BRONCHI	ASSOCIATED PATHOLOGY
Chronically ill child; undernourished; râles throughout chest. Potbellied; rectal prolapse	§	§	¶	¶	Emphysema, *Staph. aureus* and *Bacillus pyocyaneus* isolated from lungs
Small child with râles throughout chest	§	§	§	§	Emphysema and atelectasis; *Staph. aureus* and *B. pyocyaneus* isolated from lungs
Small, acutely and chronically ill child with continuous cough; hyperresonant chest filled with râles	§	§	§	§	Rickets, otitis media, and bronchopneumonia; *Staph. aureus* isolated from lung
Undernourished and dehydrated; decreased breath sounds; bronchial breathing and râles in left upper lobe	§	§	§	§	Emphysema and bronchopneumonia. *Staph. aureus* and *B. pyocyaneus* isolated from lungs
Anasarca; râles in left lower lobe	§	§	§	§	Primary peritonitis and bronchopneumonia
Well-developed but undernourished child; hyporesonance over right lower lobe; poor air exchange; inspiratory râles throughout chest	§	§	§	§	Emphysema and bronchopneumonia
Emaciated child; chest hyperresonant except for both upper lobes which were hyporesonant; showers of fine râles throughout entire chest	§	§	Iron pigment only	Suggestive	Emphysema. *Staph. aureus* isolated from lungs
Small, pale, irritable child; hyporesonance and coarse râles right upper lobe	§	§	§	§	Double right ureter and kidney. *Staph. aureus* isolated from lungs
Undernourished, dyspneic child with many râles and decreased breath sounds heard bilaterally	§	§	Iron pigment only	§	Early rickets; emphysema; *Staph. aureus* isolated from lungs
Marantic child with discharging eyes; râles and decreased breath sounds right upper lobe	§	§	§	§	Emphysema and bronchopneumonia; *Staph. aureus* and type 22 pneumococcus isolated from lungs

TABLE

CASE	SEX	AGE AT TIME OF ONSET	AGE AT TIME OF DEATH	FAMILY HISTORY	GASTROINTESTINAL SYMPTOMS	RESPIRATORY SYMPTOMS
11 (D. G.)	F	1 mo.	6 mo.	Siblings and parents well	On adequate diet weighed 8 lb., 14 oz. at 5 mo.; 6 to 7 large, greasy, foul stools daily	Chronic cough
12 (C. M.)	M	3 wk.	2 mo.	No siblings; both parents well	On adequate diet weighed 6 lb., 13 oz. at 2 mo.	Cough
13 (P. S.)	F	1 yr.	3 yr.	Previous sibling† died elsewhere of proved fibrocystic disease; parents well	Severe diarrhea; weight unknown.	Chronic cough and repeated upper respiratory infections
14 (E. F.)	M	2 mo.	5 mo.	2 siblings and parents well	On adequate diet weighed 9 lb., 7 oz. at 5 mo.	Cough
15* (J. S.)	M	4 mo.	4 yr.	2 miscarriages; 1 sibling died at 3 days due to thymus (?); 1 sibling and both parents well	Polyphagia and large stools; weight unknown	Chronic cough
16 (W. W.)	M	1 mo.	1 mo.	2 siblings and parents well	Breast fed; weighed 1¾ lb. less than 8 lb. birth weight	Cough
17* (H. K.)	F	4 mo.	8.5 mo.	2 siblings and parents well	Adequate diet, but weighed only 13 lb., 13 oz. at 8 mo.	Chronic cough
18 (R. J. R.)	M	3 days	3 wk.	1 sibling died at 4 mo. from pneumonia and malnutrition; parents well	None	Cyanosis
19 (R. R.)	M	4 wk.	7 wk.	None available	Vomiting for 1 day	Cough and coryza for 3 wk.
20 (B. G.)	F	Birth	5 days	Illegitimate child whose mother had epilepsy with dementia	Weight unknown; ate poorly; malnourished	None
21 (L. B.)	M	4 mo.	14 mo.	No siblings; parents well	Anorexia; one episode of foul stools at 11 mo. of age; weight 14 lb. at 14 mo.; on adequate diet	Chronic cough; intermittent attacks of cyanosis and wheezing
22 (C. S.)	F	2 wk.	2.5 mo.	None available	On adequate diet weighed 6 lb., 2 oz. at 2.5 mo.; birth weight was 3 lb., 2 oz.	Cough, coryza, and dyspnea

I—CONT'D

PHYSICAL FINDINGS	CYSTIC FIBROSIS OF PANCREAS	LUNG ABSCESSES	LIVER STEATOSIS	SQUAMOUS METAPLASIA OF TRACHEA AND BRONCHI	ASSOCIATED PATHOLOGY
Malnourished child with showers of fine râles throughout entire chest	§	¶	¶	¶	Emphysema, atelectasis, and bronchitis
Undernourished child with decreased breath sounds on the right and many râles throughout the chest.	§	§	§	§	Confluent bronchopneumonia
Emaciated, chronically ill child with showers of râles bilaterally	§	§	§	§	None
Undernourished child with left proptosis; right chest filled with râles	§	§	§	§	Emphysema; *Staph. aureus* isolated from the lungs
Coarse and fine râles throughout entire hyperresonant chest; poor air exchange	§	§	§	¶	Large abscess cavities in lungs from which *Staph. aureus* was isolated
Coarse and fine râles throughout entire chest	§	§	¶	¶	*Strep. viridans* isolated from lungs
Showers of fine râles throughout entire chest	§	§	§ Iron pigment	§	Emphysema and atelectasis; *Staph. aureus* isolated from lungs
Heart shifted to the right; dullness; decreased breath sounds and bronchophony over right chest	§	§	¶	§	Emphysema on the left and atelectasis on the right
Cyanotic, dehydrated child; potbelly; Cheyne-Stokes respirations; fine moist râles throughout entire chest	§	§	¶	¶	Emphysema and atelectasis; *Staph. aureus* isolated from lungs
Moribund child with left facial paralysis	§	§	¶	¶	Atelectasis and cerebral hemorrhage
Emaciated, cyanotic and wheezing child; poor air exchange; showers of râles bilaterally	§	§	§	Suggestive	Emphysema and right hydronephrosis
Hyporesonance right upper lobe; inconstant râles bilaterally	§	§	§	¶	None

TABLE

CASE	SEX	AGE AT TIME OF ONSET	AGE AT TIME OF DEATH	FAMILY HISTORY	GASTROINTESTINAL SYMPTOMS	RESPIRATORY SYMPTOMS
23*† (J. S.)	M	3 wk.	3 mo.	Twin brother well and weighed 10 lb. at 3 mo.; no other siblings; parents well	On adequate diet but weighed 6 lb., 2 oz. at 3 mo.; 2 to 5 large yellow stools daily	Rattle in throat
24 (C. M.)	M	3 wk.	4 mo.	2 siblings and parents well	On adequate diet weighed 9 lb. at 4 mo.	Wheezing and cyanotic since neonatal period
25 (C. S.)	F	Birth	45 hr.	1 sibling living with fibrocystic disease; parents well	Acute condition of abdomen	None
26 (H. C.)	M	3 wk.	4 wk.	No siblings; parents well	Weighed 9 lb. at 1 mo.	Cough for 4 to 5 days; expiratory grunt

intestinal tract. This limited concept of the formation of a steatorrheic stool does not coincide with the variable percentage of total fat and the frequently increased amounts of free fatty acids and soaps that have been noted in children with fibrocystic disease.

If the digestive enzymes of the child's bowel are considered, it will be realized that the pancreas is not the sole cleaver of carbohydrates, proteins, and fats. There is good evidence of protein[17] and fat[18, 19] digestion in the stomach. It is known that the succus entericus contains enzymes acting upon the main classes of food.[20] Further, there is evidence of enzymatic activity by the bacterial flora of the intestinal tract.[21] In different individuals and even in the same individual, the enzymatic activity in different portions of the bowel and the potency of the many ferments will not remain constant.[22, 23] The absorptive and motile power fluctuate widely. The ever-changing summation of intestinal activities is continually reflected in the stools. Hence, it is unwise to place much diagnostic faith in a "characteristic" stool, and particularly in a single stool specimen.

In the presence of markedly decreased or even absent pancreatic secretions enzyme cleavage continues in both the stomach and intestines.[24, 25] Whether or not the end cleavage products are absorbed depends upon a number of factors; in the case of fatty acids: the presence of bile salts,[26] the motility of the bowel,[26] and the integrity of the phosphorylation mechanism.[27] Should bile fail to enter the bowel the stools become white, greasy, and rich in fatty acids and soaps. When the motility of the bowel is so impaired as to affect emulsification and consequent ab-

I—CONT'D

PHYSICAL FINDINGS	CYSTIC FIBROSIS OF PANCREAS	LUNG ABSCESSES	LIVER STEATOSIS	SQUAMOUS METAPLASIA OF TRACHEA AND BRONCHI	ASSOCIATED PATHOLOGY
Emaciated child with laryngeal crow, corneal opacity, poor air exchange and showers of râles throughout chest	§	§	§	§	Xerophthalmia and keratomalacia
Very cyanotic malnourished child with chest full of fine râles	§	§	§	¶	Emphysema and bronchopneumonia
Distended tympanitic abdomen; absent bowel sounds; small meconium movements	§	¶	Iron pigment only	¶	Atelectasis; recent surgical repair of ileal perforation and intestinal obstruction
Dullness, râles and decreased breath sounds on the left; distended abdomen with visible bowel pattern	§	¶	§	¶	Emphysema; *Staph. aureus* isolated from lungs

sorption, it would seem reasonable to assume that a pabulum high in fatty acids and soaps would result, and, as a consequence, diarrhea.[28] This view is substantiated by investigations which draw attention to the importance of fat absorption in relation to gastrointestinal motility. Roentgen studies by Northman and Wendt[29] on depancreatectomized dogs fed iodipin and egg yolk showed rapid peristalsis. Handelsman and Beguria,[28] using dogs with ligated pancreatic ducts, found that a suspension of ordinary barium sulfate in water caused practically normal motility of the gastrointestinal tract while an oil barium sulfate mixture greatly accelerated it.

The vitamin A curves in patients with fibrocystic disease have been flattened and at all times under 30 units. This, like the hypocholesterolemia, may be only a reflection of poor fat absorption. Flax, Barnes, and Reichert[30] have demonstrated that in fibrocystic disease increased intestinal motility induced by cascara or prostigmine is accompanied by an elevation in the vitamin A absorption curve. This apparently is in direct proportion to the increased motility. We have felt that serial vitamin A absorption curves were of more diagnostic value than any of our other routine laboratory aids. Duodenal studies are conclusive but too difficult to be practical. Roentgenograms of the chest in far advanced cases with physical findings of emphysema and atelectasis have often revealed a mottled shadow about the heart accompanied by less dense mottling throughout both lung fields (Fig. 6). We have come to consider this picture compatible with multiple lung abscesses, probably of *Staphylococcus aureus* origin.

Although the diagnosis of fibrocystic disease ante mortem remains difficult, it may be established provided a painstaking history and physical examination are coupled with selected laboratory procedures. In support of this view, we present a typical case.

B. J. S. entered The Children's Memorial Hospital because of a persistent cough following an upper respiratory tract infection. The child's appetite had always been excellent. At the age of 14 months, however, she weighed only 19½ pounds. Delivery and development were uneventful. She had two siblings who died in childhood, one apparently from pneumonia and the other supposedly from dysentery. The mother had a heart murmur and the father was asthmatic. Physical examination revealed a well-developed, small child, not acutely ill. The chest was hyperresonant and one had the impression that alveolar air exchange was reduced. Other physical findings were not remarkable. Blood and urine examinations were noncontributory. The vitamin A curve was at all times under 30 units. Duodenal drainage was markedly decreased both in total volume and in enzyme concentration after stimulation by secretin. (Table II.) The total stool fat was approximately 39 per cent, of which over 50 per cent was free fatty acid. (Table II.) The roentgenologic examination (Fig. 6) revealed a circumcardiac halo and patchy clouding throughout both lung fields.

In Table II is presented the significant laboratory findings of B. J. S. contrasted with those of J. K., a child with celiac disease. Normal findings are also presented for comparison. It will be seen that in the patient having celiac disease, like the patient with fibrocystic disease, approximately one-third of the dried stool was fat. In each instance approximately two-thirds of the total fat consisted of free fatty acids plus soaps. These findings are not in disagreement with those reported by Holt[31] as being normal for breast-fed infants in good condition. This should re-emphasize that diagnostic faith cannot be placed in the "character" of the stools and particularly in single stool specimens.

Treatment of children with fibrocystic disease should be directed toward the pulmonary and gastrointestinal complications. For the former, we have tried bronchoscopic aspirations, postural drainage, vaccines, the sulfonamides, and penicillin, all without benefit once pulmonary abscesses have developed. The gastrointestinal disturbances have been managed by diets high in protein and low in fats. Pancreatic extracts have been administered orally before feedings. Parenteral vitamin A has been given in doses as large as 50,000 units triweekly. The response of patients to such a regime has, in a few instances, been pleasing. B. S., previously reported,[30] is now approaching her fourth birthday. When maintained on strict dietary therapy with the addition of pancreatic extracts by mouth and parenteral Vitamin A, many of her symptoms are controlled. However at 36 months of age she weighed but 23 pounds, and in order to avoid repeated respiratory infections she must spend the winters in a warm, dry climate.

TABLE II

	PER CENT TOTAL FAT IN STOOLS	PER CENT STOOL FAT AS FREE FATTY ACIDS	PER CENT STOOL FAT AS NEUTRAL FAT	PER CENT STOOL FAT AS SOAPS	DUODENAL ENZYMES (AFTER STIMULATION BY SECRETIN)			VITAMIN A CURVE			
					LIPASE	AMYLASE	TRYPSIN	FASTING	3 HR.	5 HR.	7 HR.
B. J. S. Fibrocystic disease	38.9	50.7	36.2	13.1	3.0 c.c.	0.6 Gm. liberated dextrose	0.0 Gm. liberated nitrogen	19	30	25	
Normal*	34.5	36.7	20.2	43.1	60.0 c.c.	2.0 Gm. liberated dextrose	4.0 Gm. liberated nitrogen	38	58	208	
J. K. Celiac disease	32.4	22.4	33.4	44.2	228.0 c.c.	9.7 Gm. liberated dextrose	8.0 Gm. liberated nitrogen	22	106	162	95

*Values for the stool have been obtained from Holt and associates;[31] values for enzymes from Klump and Neale[32] were obtained without secretin; values for lipase obtained in our laboratory; typical vitamin A curve obtained in our laboratory.

CONCLUSION

Twenty-six proved cases of cystic fibrosis of the pancreas are presented and the suggestion is made that the ante-mortem diagnosis of this not so uncommon condition can be facilitated by realizing the various forms in which the disease manifests itself and by the judicious use of selected laboratory procedures.

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PERTUSSIS: BACTERIOLOGIC AND AGGLUTINATION STUDIES

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PERTUSSIS is an acute, infectious disease which is most contagious during its first stages when the clinical diagnosis is especially difficult. Early diagnosis is desirable, not only for epidemiologic reasons, but also because human immune serum is most effective when given early in the disease. This has recently been pointed out by McGuinness, Bradford, and Armstrong[1] and Scheinblum, Bullowa, and Weiss.[2]

Bacteriologic and agglutination methods for diagnosis of pertussis have been investigated by many workers. In 1916, Chevitz and Meyer[3] suggested the "cough plate" method for obtaining cultures from pertussis patients to facilitate the diagnosis of this disease. This method has been used with varying success by Lawson and Mueller,[4] Gardner and Leslie,[5] Madsen[6] and Sauer.[7] In 1940, Bradford and Slavin[8] adapted the nasopharyngeal swab for obtaining cultures from pertussis patients. They found that cultures obtained in this way yielded a greater number of positive cultures with more numerous colonies and fewer secondary microorganisms than the cough plate. Brooks, Bradford, and Berry[9] in a series of 248 patients recovered *Hemophilus pertussis* from 61 per cent of them by swab in contrast to 37 per cent by cough plate.

The reports on the use of the agglutination tests as a diagnostic aid for pertussis have been conflicting. Wollstein,[10] in 1909, using patients' serums and a known pertussis antigen, considered the method not practical for the diagnosis of disease because of the irregularity of the results. Povitsky and Worth[11] considered a titer of 1:100 necessary for a positive diagnosis, as they observed agglutination in lower titers in children not ill with pertussis. In 1936, Dougherty-Denmark[12] also observed circulating agglutinins only in low titers during disease and convalescense.

However, Bennholdt-Thomsen and Dienst[13] considered positive agglutination reactions of diagnostic value as they found them in infants early in the disease. Evans and Maitland[14] and Mishulow, Mowry, and Orange[15] also found that the agglutinations became positive early in the disease and that a positive test was diagnostic.

A study of the value of the culture and agglutination methods for the diagnosis of pertussis was undertaken at the Willard Parker Hos-

From Littauer Research Fund, New York University, and Willard Parker Hospital, Department of Hospitals, New York City.
*Visiting physician (deceased).

pital. Specimens for culture were obtained simultaneously by three different methods: nasopharyngeal swab, cough plate, and laryngeal suction. Blood for agglutinin titers was also obtained at the same time in order to determine whether there was any correlation between agglutinin titers and the results of the cultures.

METHODS OF OBTAINING SPECIMENS

The Chevitz-Meyer Cough Plate.[3]—In this method two Petri dishes with a modified Bordet-Gengou medium were used. Inoculation of these plates during a natural paroxysm was found to be preferable. However, when this was impossible, a cough was induced by stroking the anterior surface of the neck or by tickling the posterior pharyngeal wall with a tongue depressor. Frequently the passage of the nasopharyngeal swab would induce the cough when all other methods failed. The plates were held at approximately five inches from the mouth, while the patients coughed twenty to thirty times. The plate was rotated slowly during this time to obtain equal distribution of the inoculum.

The Nasopharyngeal Swab.—In this method the swabs for culturing the nasopharynx were prepared by dipping the end of a 7 inch piece of flexible chromel wire (No. 5)* in collodion and then wrapping a small bit of cotton around it. The collodion secured the cotton firmly to prevent its loss in the nares. Each swab was then sterilized in a plugged 5⅜-inch test tube. The cultures were taken by gently passing the swab back through the nares until it touched the posterior nasopharyngeal wall and then rotating the wire. Both left and right nares were cultured separately.

The Laryngeal Suction.—The mucus which is produced in large amounts during attacks of cough seemed to be excellent material for culture. The method of laryngeal suction, as described by Auger[16] and Bullowa[17] for collecting the mucus before contamination by the oral flora seemed the most desirable for our purposes. The apparatus used in this study was a modification of the Simon apparatus used by Bullowa.

A rubber catheter was inserted toward the uvula and while the patient was coughing and gagging the catheter was pushed toward the larynx. A rubber bulb was compressed and released until sputum was visible in the irrigating tip which was connected to the catheter and bulb by rubber tubing. The catheter was then removed and the irrigating tip with the sputum was detached from its rubber connection and placed in a Petri dish for transport to the laboratory.

CULTURE METHODS

All specimens were cultured within one hour after they were obtained on a modified Bordet-Gengou medium. The following formula was used:

*Supplied by Hoskins Manufacturing Company, Detroit, Mich.

Scraped potatoes	500 Gm.
Glycerine (U.S.P.)	40 ml.
Tap water	1,000 ml.

Boil until potatoes are soft, filter through two layers of gauze and use filtrate as potato extract.

Potato extract	500 ml.
Sodium chloride	11 Gm.
Proteose peptone	20 Gm.
Agar (Difco)	60 Gm.
Tap water	1,500 ml.

Boil to dissolve agar. Two mg. nicotinic acid was added just before bottling.

The media was bottled in 50 ml. amounts and autoclaved at fifteen pounds for fifteen minutes. Twenty milliliter of horse blood was added to each 100 ml. of medium and plates poured just before use.

The addition of proteose peptone and nicotinic acid as suggested by Hornibrook[18] appeared to promote the growth of *H. pertussis*. The colonies were larger and more numerous on this medium than on the medium prepared by the American Public Health formula.[19]

The nasopharyngeal swabs were rotated on one corner of a plate and then by using a straight wire were streaked through the corner and then serially on to a second plate. The laryngeal secretions were treated in a like manner, except that three plates were streaked serially. The serial streaking of plates was done in an effort to obtain individual colonies of *H. pertussis* free from secondary microorganisms. The plates were incubated for ninety-six hours at 37° C., and were examined daily. Typical colonies were examined by stained smear and confirmed by the rapid agglutination method of Kendrick.[20] A phase I anti-pertussis rabbit serum* was used.

AGGLUTINATION METHOD

Evans and Maitland[14] in 1939 adapted the Welch-Stuart[21] method of slide agglutination for the diagnosis of pertussis and found it superior to the tube agglutination. Mishulow[22] confirmed their findings in a series of 342 sera.

The method of Mishulow was used in our studies with a pertussis antigen preserved with merthiolate and containing 100 billion microorganisms per milliliter.† The sera were tested undiluted and 0.01, 0.02, 0.04 and 0.08 ml. were pipetted in the center of four paraffin rings on a glass slide. One drop (0.015 ml.) of antigen and one drop of saline were added to each amount of serum and then each serum antigen mixture was thoroughly mixed with a wooden applicator. The slide was tilted back and forth for three minutes, but readings were made macroscopically at the end of each minute. The agglutination titer was determined by the highest dilution giving agglutination. In high titers the sera were diluted 1:10 to determine the end points of the titration.

*Obtained from the Lederle Laboratories, Inc., Pearl River, N. Y.
†This antigen was supplied by Eli Lilly and Co., Indianapolis, Ind.

The fifty-three patients included in this study were admitted to the hospital with a diagnosis of pertussis. Cultures were obtained by all three methods at the same time. Twenty-eight patients were under 1 year of age; eighteen were in the 1- to 3-year age group; and seven patients were 3 to 6 years old. The duration of illness ranged from three to forty-four days at time of culture.

RESULTS

A total of 279 specimens were taken on the fifty-three pertussis patients studied. On ten patients who had negative cultures on the first series, a second series of specimens were taken, and a third series on two patients. In only two of the ten patients were positive results obtained on second culture. All these specimens were cultured in the manner previously described.

There was an advantage in taking cultures from both nares as thirteen cultures from the right nostril were positive when the left was negative and four cultures were positive on the left nostril when the right nostril was negative. Streaking the plates serially proved helpful because from the second plate of each series *H. pertussis* was more easily isolated and identified. Positive results were obtained from ten of the second plate of the swabs and from six plates of laryngeal suctions when the first plates were overgrown with secondary microorganisms. The third plate of the laryngeal suction series yielded very few positive cultures and in no instance was *H. pertussis* found when the other two plates were negative. As the two cough plates were taken simultaneously at the bedside, no such comparison can be made.

H. pertussis was isolated from forty (75.5 per cent) of the fifty-three patients by one or more of the methods. Of these forty patients, thirty-five (87.5 per cent) had positive cultures by nasopharyngeal swab, twenty-two (55 per cent), by laryngeal suction and twenty (50 per cent), by cough plate. In eight patients *H. pertussis* was recovered only by nasopharyngeal swab, in three patients only by laryngeal suction and in two patients only by cough plate, when the other two methods were negative.

TABLE I

DURATION OF ILLNESS IN RELATION TO RESULTS OBTAINED BY CULTURES

DURATION OF ILLNESS	NUMBER OF CASES CULTURED	POSITIVE CASES BY ALL METHODS		POSITIVE CASES		
		NO.	PER CENT OF TOTAL	BY N.P.*	BY L.S.†	BY C.P.‡
3 to 10 days	12	10	83.3	8	4	3
11 to 20 days	20	17	85.0	15	10	8
21 to 30 days	15	9	60.0	8	5	8
31 to 44 days	6	4	66.6	4	3	1
Total	53	40	75.5	35	22	20

*Nasopharyngeal swab.
†Laryngeal suction.
‡Cough plate.

TABLE II

AGGLUTININ TITERS OF FIFTY PERTUSSIS PATIENTS IN RELATION TO AGE AND DURATION OF DISEASE AND CULTURE

CASE	AGE	DURATION OF ILLNESS (DAYS)	AGGLUTININ TITER	CULTURE
2	5 mo.	14	1:160	Negative
4	12 mo.	19	1:160	Negative
7	9 mo.	35	1:1600	Negative
9	8 yr.	7	1:80	Positive
10	12 mo.	31	1:3200	Positive
11	10 mo.	28	1:320	Positive
13	6 yr.	24	1:320	Positive
23	8 mo.	24	1:160	Positive
27	2 yr.	4	1:40	Positive
50	12 mo.	14	1:320	Positive
51	10 mo.	25	1:160	Positive
54	5 yr.	16	1:80	Positive
1	2 mo.	7	Negative	Positive
3	11 mo.	27	Negative	Negative
5	5 mo.	23	Negative	Negative
6	5 mo.	14	Negative	Negative
8	2½ yr.	15	Negative	Positive
12	2½ yr.	39	Negative	Positive
14	4 mo.	20	Negative	Negative
15	3 mo.	29	Negative	Positive
16	12 mo.	15	Negative	Positive
17	3 mo.	28	Negative	Negative
21	6 wk.	35	Negative	Positive
24	7 mo.	21	Negative	Positive
25	8 mo.	5	Negative	Positive
26	3 yr.	45	Negative	Negative
29	2 yr.	14	Negative	Positive
31	3 wk.	11	Negative	Positive
32	18 mo.	19	Negative	Positive
33	2 mo.	17	Negative	Positive
34	4 yr.	15	Negative	Negative
35	12 mo.	6	Negative	Positive
36	8 mo.	6	Negative	Positive
37	2 yr.	13	Negative	Positive
38	18 mo.	14	Negative	Positive
39	8 mo.	20	Negative	Positive
40	18 mo.	23	Negative	Positive
41	7 wk.	3	Negative	Positive
43	8 mo.	16	Negative	Positive
44	5 yr.	8	Negative	Positive
47	12 mo.	14	Negative	Positive
48	2 yr.	7	Negative	Positive
49	2 mo.	23	Negative	Positive
52	18 mo.	15	Negative	Positive
53	4 yr.	17	Negative	Positive
55	3 mo.	14	Negative	Positive
56	12 mo.	15	Negative	Positive
59	10 mo.	28	Negative	Negative
60	2½ mo.	7	Negative	Positive
61	4 mo.	21	Negative	Negative

Specimens obtained by the nasopharyngeal swab yielded the greatest number of positive cultures in all age groups, and the laryngeal suction method, more positive cultures than the cough plate.

There was direct correlation between the duration of the disease and the cultures positive for *H. pertussis* as has been the experience of other investigators. The majority of the cultures were taken during the first

three weeks of illness (Table I). From the thirty-two patients cultured during this period positive cultures were obtained from twenty-seven (84.3 per cent). Cultures obtained from twenty-two patients during the fourth to sixth week of illness yielded only thirteen (59 per cent) positive. However, *H. pertussis* was isolated in one instance as late as the forty-fourth day of illness. *H. pertussis* was isolated from more patients, regardless of the duration of illness, by the nasopharyngeal swab than by either of the other two methods.

Fifty patients in our series were tested for the presence of circulating agglutinins. Blood for this purpose was obtained at the same time as cultures. The duration of illness of these fifty patients ranged from four to forty-five days. Only twelve (14 per cent) patients showed the presence of agglutinins. None of the six non-pertussis control patients tested showed the presence of circulating pertussis agglutinins. Agglutination titers of 1:40 and 1:80 were obtained from two patients during the first week of illness. However, the other ten patients showing positive agglutinations in higher titers ranging from 1:80 to 1:3200 were in the third, fourth, and fifth week of illness. (Table II.)

There was apparently little correlation between the results of the cultures and the agglutination titers. Of the thirty-eight patients tested who had positive cultures only nine showed presence of agglutinins, and of the twelve patients who had negative cultures only three showed the presence of agglutinins. The age of the patients did not seem to influence the production of circulating agglutinins.

SUMMARY

1. Seventy-four comparative tests with nasopharyngeal swab cultures, laryngeal suctions and cough plates were made in fifty-three cases of pertussis. In every age group and in every week of the disease the swabs yielded a higher percentage of cultures positive for *H. pertussis* than did either the laryngeal suctions or the cough plates, and the suction material more positives than the cough plates.

2. The suction method of obtaining specimens is cumbersome and as the results are only slightly better than the cough plates it cannot be considered as a practical routine procedure.

3. The nasopharyngeal swab in combination with the cough plate are the methods of choice for obtaining the maximum number of cultures positive for *H. pertussis*.

4. Serial streaking of swabs on the media yielded individual colonies from which *H. pertussis* could be readily identified.

5. Circulating pertussis agglutinins were found only in 14 per cent of the patients. The absence of agglutinins, therefore, does not exclude the diagnosis of pertussis.

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PERIARTERITIS NODOSA

Report of Two Cases, One Complicated by Intrapericardial Hemorrhage

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PERIARTERITIS nodosa is an inflammatory disease of the arteries of unknown etiology. It is a rare disease in children although an increased number of cases have been reported recently. Death has been reported as due to profuse hemorrhage, secondary to the rupture of arterial aneurysms in various vital areas.

It is the purpose of this communication to present two additional cases of periarteritis nodosa, one complicated by a fatal intrapericardial hemorrhage similar to the case reported in an adult by Vance and Graham in 1931.*

Case 1.—N. C., a 5-year-old white female infant, was admitted to the Louisville General Hospital, Feb. 5, 1943, with the chief complaint of "scre throat." Her illness began Jan. 31, 1943, with a temperature of 105.5° F. Two days later she developed a generalized rash. She had vomited intermittently for several days and at times complained of "painful feet."

Her past history revealed that she had been a patient in the Louisville General Hospital from March 4 to 15, 1939, at which time *Bacterium dysenteriae* Flexner were isolated from her stools. She had varicella, measles, and pertussis during previous two years without complications.

She had been immunized against diphtheria and smallpox.

Her father had an acute pharyngitis the week previous to her admission to the hospital.

Physical Examination.—The patient was a well-developed and well-nourished white female, 5 years of age, appearing acutely ill and very lethargic. The tonsils and pharynx were moderately injected. Examination of the feet and hands revelead localized areas of redness which were not characteristic of a scarlatiniform rash. Her temperature was 103.6° F., respiration, 40, and heart rate, 160 per minute.

The clinical impression on admission was acute tonsillitis, pharyngitis, and possible scarlatina.

Laboratory Findings.—Her red blood cell count was 4,700,000 per cubic millimeter with hemoglobin of 12 Gm. per 100 c.c. of blood and the white blood count was 22,000 with 60 per cent polymorphonuclear leucocytes, 38 per cent lymphocytes, 1 per cent monocytes, and 1 per cent eosinophiles. The tuberculin test, Kahn test and throat cultures for hemolytic streptococci and diphtheria bacilli were all negative. Urinalysis revealed no abnormal findings. This Schick test was positive.

Course.—She was given 0.5 Gm. of sulfathiazole every four hours. The next day she was still somewhat drowsy but ate fairly well. Her temperature gradually receded.

The following day, Feb. 7, 1943, the temperature was normal but fluids were taken poorly. On February 8, her temperature was still normal and she seemed much improved. Sulfathiazole was discontinued at 8:00 P.M.

From the Department of Pediatrics, University of Louisville School of Medicine, services of Dr. James W. Bruce and Dr. W. W. Nicholson.

*Vance, B. M., and Graham, J. E.: Arch. Path. 12: 521, 1931.

On February 9, at 8:30 A.M., 0.5 c.c. of diphtheria toxoid was given.

At 9:00 A.M. she was found dead in bed.

Post-Mortem Examination.—The body was that of a well-developed female with cyanosis of the nail beds and areas of erythema over the medial aspect of both thighs.

The peritoneal cavity revealed that the edge of the liver was 10 cm. below the ensiform cartilage and 5 cm. below the right costal margin. Cut sections of the liver revealed congestion. The kidneys showed evidence of cloudy swelling. The remainder of the abdominal viscera was normal.

The pericardial cavity stood out as a bluish-colored, distended sac. When opened, approximately 75 c.c. of reddish serous fluid exuded. Further inspection revealed that a blood clot surrounded the heart. The entire thoracic contents were then removed en masse for photography (Fig. 1).

Fig. 1.—Pericardial tamponade.

The blood clot was removed and the site of the hemorrhage was found to be in the region of the anterior descending branch of the left coronary artery near the base of the heart. At this site there was an elevation of approximately 2.5 cm. by 1.0 cm. and when opened and enlarged it was found to be in direct communication with the vessel distal and proximal. A probe in the aneurysmal sac is shown in Fig. 2. The heart weighed 110 Gm. All valves were examined and revealed no evidence of abnormalities.

The lungs displayed a few small areas of atelectasis and consolidation. The brain was edematous and the meningeal arteries appeared injected.

Microscopy.—There was pyknosis of the heart muscle cells. The aneurysmal sac of the artery revealed a laminated clot which demonstrated both an old and a recent hemorrhage. The intima was absent. The media adjacent to the heart was normal but frayed out laterally to such an extent as to consist only of fat tissue which had

an inner zone of necrosis. The lesion appeared to be of infectious origin and the infiltrating cells were mainly neutrophiles. Most of the artery wall was destroyed leaving the epicardial tissue to form the wall of the aneurysmal dilatation (Figs. 3 and 4).

No lesions similar to that found in the heart could be demonstrated in the other parts of the body.

Fig. 2.—Probe in aneurysmal sac.

Fig. 3.—Inflammatory process of the coronary artery wall.

The lungs were consistent with an early bronchopneumonia.

The liver and kidneys revealed moderate cloudy swelling.

Due to a heavy leucocytic infiltration areas of splenic destruction were found.

CASE 2.—A. K. O., a 9-month-old white female, was admitted to the Children's Free Hospital, July 14, 1943. Four weeks prior to admission this patient became ill with pharyngitis and fever. She was seen by a local physician who placed her on sulfathiazole, 0.5 Gm. every four hours. Following the fifth dose of sulfathiazole a skin eruption appeared. She was taken to a private hospital where 5 per cent sodium sulfathiazole was given intravenously and her condition seemed to clear.

A few days later she again became febrile. Urinalysis at this time revealed pus cells. According to the parents, phenobarbital was administered for marked irritability and fretfulness, following which she developed a fine erythematous rash which seemed to be aggravated by each successive dose. Sedation was changed to amytal with ephedrine sulfate without improvement. The informant stated that the rash was more pronounced at night and disappeared almost entirely in the daytime. On the day prior to admission she developed edema of the face and extremities.

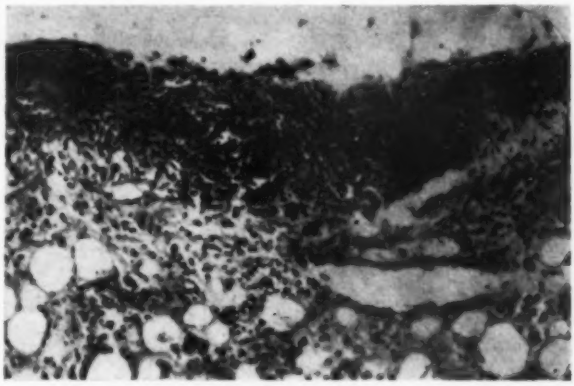

Fig. 4.—Section of wall of the aneurysmal sac.

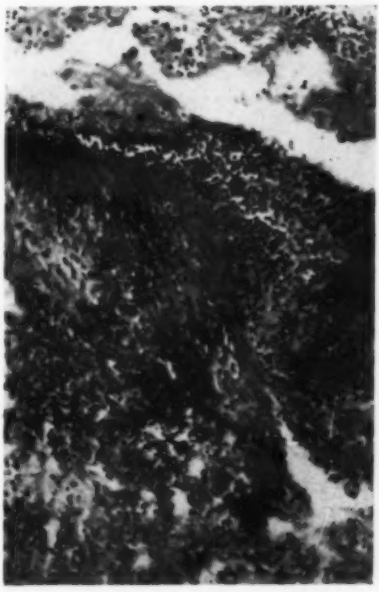

Fig. 5.

Fig. 6.

Fig. 5.—Section of coronary artery with wall destruction.
Fig. 6.—Section of vessel of the kidney.

Physical Examination.—The patient was a well-developed, well-nourished, irritable infant who appeared acutely ill. The entire body surface was covered by a fine erythematous rash which blanched on pressure. There was edema of the face and lower extremities. The liver was palpable one fingerbreadth below the right costal margin. The remainder of the physical examination was negative.

Laboratory Findings.—The red blood cell count was 4,050,000 per cubic millimeter with a hemoglobin of 9.8 Gm. per 100 c.c. of blood and the white blood cell count was 18,000 with 40 per cent polymorphonuclear leucocytes, total myeloids 59 per cent, total lymphocytes 38 per cent and monocytes 3 per cent. A complete hematologic study revealed the lymphocytes as being somewhat atypical and this was interpreted as probably due to an allergic condition. Urinalysis was negative.

Roentgenogram of the chest showed a chronic inflammatory process in the right lung base and slight left cardiac hypertrophy.

Agglutinations for evidence of typhoid, para-typhoid A and B, and undulant fevers, and tularemia were negative. The clinical impression was a possible drug allergy.

Course.—Her course in the hospital was marked by a low grade fever but no medication was used and the rash soon cleared. On the second day the infant seemed considerably improved and less irritable. On the morning of July 16, 1943, the patient took her six o'clock formula well. A few minutes after feeding, while the diaper was being changed, the nurse noticed that the child became cyanotic, gasped and died. Efforts at resuscitation were futile.

Post-Mortem Examination.—The body was that of a white female infant 9 months of age weighing 22 pounds. The body surface showed nothing more than a slight cyanosis of the nail beds.

The peritoneal cavity revealed an enlarged liver on the surface of which were a few yellowish areas suggesting acute degeneration.

The heart was enlarged, the apex being at the fifth interspace in the anterior axillary line. The epicardium had a few scattered petechial hemorrhages. The left coronary artery and the left descending branch were firm and dilated for about 2½ cm., starting about 1 cm. below the coronary orifices. The area was dilated so that the interior diameter of the vessel was 3 mm. This was opened aseptically and a clot was found which was old and laminated. The right coronary vessel was also dilated for about 2½ cm. starting below the orifice.

Microscopy.—Both coronary vessels showed laminated clots near the site of their origin. Some of these thrombosed areas were quite hard, others were soft and more recent. The walls of these vessels were heavily infiltrated with polymorphonuclear leucocytes and monocytes. In some areas the wall was necrotic, seemingly to such an extent that rupture seemed imminent (Fig. 5). Even the smaller branches revealed a similar pathology. No evidence of scarring or infarction was present in the heart muscle. Similar pathologic changes were found in the right iliac vessel near the bifurcation of the abdominal aorta.

In addition to cloudy swelling, the typical pathology of periarteritis nodosa was demonstrated in the kidney (Fig. 6) and to a lesser extent in the liver and in the uterus.

Culture from the clot proved to be *Bacterium anaerogenes.*

SUMMARY

Two cases of periarteritis nodosa in children are reported. Periarteritis nodosa of the coronary arteries was demonstrated in both patients; in Case 1, there was fatal intrapericardial hemorrhage due to the rupture of an aneurysm; in Case 2, the pathology was so extensive that rupture seemed imminent.

We wish to express our appreciation to Dr. A. J. Miller of the Department of Pathology and Dr. J. A. Kennedy of the Department of Bacteriology.

ERYTHEMA NODOSUM IN CHILDREN

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THE relationship of erythema nodosum to tuberculosis has been discussed repeatedly in textbooks of dermatology and tuberculosis and in medical journals published in the United States and abroad. Most authors conclude that this syndrome is a nonspecific inflammatory reaction due to a variety of causes. The most common etiologic factors named are tuberculosis and infection with streptococci.

In this survey we are interested mainly in the answers to two questions: (1) Is erythema nodosum in children seen sufficiently often in the United States to justify stressing its use in diagnosis? (2) Does the etiology of erythema nodosum vary in different age groups? If so, is this a partial explanation of the diversity of opinion in the literature regarding the etiology of erythema nodosum?

Erythema nodosum is apparently common in northern continental Europe and especially in Scandinavia. Wallgren[1] described 800 cases from his clinic in Sweden. Ernberg[2] reported over 200 cases chiefly in children. Ustvedt and Johannessen[3] presented a long-term survey of 314 individuals who had had typical erythema nodosum. Sandra[4] reported 120 cases seen in a consultation center for tuberculous patients. Moreover large epidemics of erythema nodosum have been described, again chiefly in Scandinavian countries, and Wallgren[1] has observed ten such outbreaks. Göbel[5] described a school epidemic of 117 cases which was traced to a teacher suffering from open tuberculosis. It seems to be a generally accepted fact that erythema nodosum is common in northerly climates. Goldberg-Curth[6] suggested that racial characteristics inherent in the skin may play a predisposing part. Bindschedler[7] believed that there is a familial tendency as well as a racial one. No reports of large series of cases from southern climates can be found in the literature. Laurinsich[8] reported 45 cases from Italy. Sarrouy[9] reported a twelve-year study among the natives of Algiers during which he saw "many" cases of erythema nodosum and reported 6 typical cases. Aguirre[10] reported an intensive study of 12 cases from Argentina.

In the United States Spink[11] has analyzed all cases of erythema nodosum recorded in Boston City Hospital from 1924 to 1935 inclusive. Of 133 cases studied only 11 were under 10 years of age. The disease was most frequent in females 20 to 29 years of age, and the oldest

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patient was over 70 years of age. Dickey, in 1930,[12] reported 8 cases of erythema nodosum observed in the Pediatric Service of Stanford Medical School from 1925 through 1930, an incidence of about 1 case in 900 children. In 1932[13] he reported 7 additional cases in children from the same service and notes that during the previous year in the Stanford Clinics for adults the diagnosis of erythema nodosum had been made seven times.

In the chest clinic of the Children's Medical Service of Bellevue Hospital we have been impressed by the relative rarity of erythema nodosum. We therefore decided to make a survey of our cases over a period of years. As a preliminary study we ascertained from the records the number of patients, adults and children, with erythema nodosum who were discharged from Bellevue Hospital between Jan. 1, 1925, and Dec. 31, 1938. Records from the psychiatric and alcoholic wards were not included. Excluding these services, 536,380 patients were discharged from Bellevue Hospital during the fourteen years studied. For the entire period only 42 cases could be found. The ages varied from 2 to 26 years. Thirty-two were under 15 years of age and of these, 19 were under 10 years of age.

It is obvious that in none of these three American hospitals can erythema nodosum be considered a frequent disease (Table I). Since this disease entity is encountered so uncommonly in children in the United States it cannot be used extensively as a means of differential diagnosis. However it may be interesting and important to know the etiology of erythema nodosum when it does occur in children.

TABLE I

OCCURRENCE OF ERYTHEMA NODOSUM IN U. S.

	YEARS OF STUDY	CASES		TOTAL ADMISSIONS (PER CENT)
		TOTAL NUMBER	UNDER 15 YR.	
Boston City Hospital (Spink)	1924 to 1935	133	11	Not stated
Bellevue Hospital*	1925 to 1938	42	19	.0089
Stanford Medical School Pediatric Service (Dickey)	1926 to 1930	8†		.11†
Bellevue Hospital,* Children's Medical Service	1925 to 1938	24†		.075†

*This does not include records of psychiatric and alcoholic wards.
†All under 15 years of age.

Scandinavian observers insist on the causal relationship of tuberculosis to erythema nodosum. Wallgren[1] stated that 95 per cent of the cases in Sweden are associated with tuberculous infection. In his series of 800 cases,[1] 766 were of tuberculous origin and 750 of these occurred concomitantly with the development of the primary focus. He stated that erythema nodosum "in a tuberculin positive individual nearly always indicates that the tuberculous infection took place three to eight weeks previously. In addition to this primary type there is a rather

rare postprimary form of tuberculous erythema nodosum. This latter occurs when the allergic state is modified, for instance by certain acute infections." Wallgren cited 16 cases of this postprimary form of erythema nodosum. He emphasized the fact that in the postprimary form the eruption appeared during recovery from an acute infection whereas in 34 cases of erythema nodosum not associated with tuberculosis, the eruption appeared *simultaneously* with an acute infection. He reported[14] 3 cases of "true rheumatic erythema nodosum," but emphasized the rarity of such cases. Seventy-one per cent of the 38 cases of erythema nodosum reported by Collis[15] in London were associated with tuberculosis, in spite of the fact that they occurred in a special group of 700 children with streptococcal diseases. In Dublin, on the other hand, Collis[16] recorded 20 cases of erythema nodosum of which only 1 was associated with streptococcal disease and the rest with tuberculosis. Collis believed that every case of erythema nodosum should be regarded as tuberculous until proved otherwise.

Of the 42 patients with erythema nodosum seen on the wards of Bellevue Hospital from 1925 to 1938, 24 were on the children's medical service where medical cases through the age of 12 years are treated; 4 were admitted to the children's surgical service; the remaining 14 cases were found in the records of the adult wards, of these, 4 patients were under 15 years of age. The cases on the children's medical service show an incidence of 1 case in 1,340 children.

On the adult wards no attempts had been made to find the etiology of the erythema nodosum except to exclude tuberculosis and rheumatic fever by history and physical examination and in five cases by x-ray picture. Only 1 case was definitely associated with tuberculosis, a man of 21 with the primary form of the disease. There were 2 patients with definite diagnoses of rheumatic fever and another suspected of this disease. In 1 patient the etiology of the erythema nodosum was unknown during a first attack but during a second attack acute rheumatic fever developed. As in other series, most of the patients (64 per cent) were female. Thirteen of the patients were white, one Puerto Rican, and there were no Negroes. The 14 patients had 15 attacks of erythema nodosum, 13 occurring in the winter and spring and only 2 in the summer. This seasonal distribution is also the usual one reported.

In the group of cases from the children's service there were 28 patients from 2 to 12 years of age of which 15 were boys. This is in contrast to the sex distribution in adults with erythema nodosum. There were two Puerto Ricans and one Negro in this group. A larger proportion of white children is represented in this group with erythema nodosum than is usually seen on the wards of the Children's Medical Service at Bellevue Hospital. Since this racial selection of erythema nodosum also appears in the adult cases, it may be of significance. Twenty-three of the 28 cases occurred in winter and spring, about the

Fig. 1.—H. D., 3 years old. Roentgenogram taken Feb. 23, 1934, showing slightly enlarged right root. The physical examination was essentially negative except for erythema nodosum which began Feb. 20, 1934.

Fig. 2.—Roentgenogram taken Feb. 28, 1934, showing primary focus of tuberculosis in second right interspace and rapid increase in size of bronchopulmonary nodes.

Fig. 3.—Roentgenogram taken March 7, 1934, showing continued increase in size of primary complex.

Fig. 4.—Roentgenogram taken Feb. 1, 1937, showing calcified residue of primary focus.

same seasonal occurrence as in the older group. There were 4 cases in the autumn and 1 in summer.

Of the 28 children, 1 boy (who was admitted to the surgical service) did not have a tuberculin test. Of the remaining 27, 7 had negative Mantoux tests. Five of these had no evidence of any other infection responsible for the erythema nodosum, 1 had acute rheumatic fever, and in 1 the onset of erythema nodosum was concomitant with an attack of chorea. In 7 of the 20 patients with positive tuberculin tests the erythema nodosum apparently coincided with the onset of the primary tuberculosis. A typical case illustrating this is shown in Figs. 1 to 4. Four additional cases showed active primary tuberculosis on x-ray but there was no evidence of recent onset; in one of these cases primary tuberculosis was present eighteen months before the erythema nodosum occurred. Another patient, a boy 11 years of age, had a primary tuberculosis followed by pleurisy with effusion and two months later developed erythema nodosum. In two children x-ray pictures showing calcified primary tuberculosis accounted for the positive tuberculin tests but the patients also had definite evidence of rheumatic fever; in one, active carditis, in the other, a purpura.

Of the 7 patients with positive tuberculin tests and no x-ray evidence of tuberculosis, 1 had acute tonsillitis with joint pains and a heart murmur at the time of the erythema nodosum. The remaining 6 showed no evidence of any other infection and since the erythema nodosum in childhood have not developed any evidence of tuberculosis.

Of the 28 cases we have definite evidence of active tuberculosis associated with erythema nodosum in 11 children. In 7 of these the erythema nodosum was associated with primary tuberculosis. In 4 patients the erythema nodosum was equally definitely associated with acute rheumatic fever and in 1, with an acute tonsillitis. In the remaining 12 cases no definite etiology could be assigned to the erythema nodosum.

The percentage of positive tuberculin tests in children with erythema nodosum is much higher than in the general ward population of the Children's Medical Service of Bellevue Hospital. The percentage of positive reactors in children from 2 through 12 years of age varied from 25 per cent in 1921 to 17 per cent in 1938.[17, 18] Of the 27 children with erythema nodosum who were tested with tuberculin 20, or 74 per cent, were positive (Table II). Dickey[13] reported that 100 per cent of his patients with erythema nodosum had positive tuberculin tests and most of them had x-ray evidence of tuberculosis.

Having found that an undue proportion of children with erythema nodosum have positive tuberculin tests, we next wished to inquire how many children with tuberculosis have erythema nodosum. From Oct. 1, 1930, we have been conducting a statistical analysis of all cases of tuberculosis on the children's medical service in both wards and outpatient department. Between Oct. 1, 1930, and Dec. 31, 1938, 362

TABLE II

OCCURRENCE OF POSITIVE TUBERCULIN REACTIONS IN ALL CASES ADMITTED TO CHILDREN'S MEDICAL SERVICE AND IN CASES OF ERYTHEMA NODOSUM

YEARS OF STUDY	CASES TESTED (TOTAL NUMBER)	POSITIVE REACTORS (TOTAL NUMBER)	POSITIVE REACTORS (PER CENT)
All cases admitted:			
1921 to 1928	4,090	987	25.6
1930 to 1938	10,338	2,154	20.8
Cases of Erythema Nodosum:			
1924 to 1938	27	20	74.0

consecutive cases of active primary tuberculosis in children over 2 years old were studied. In this group during this same period erythema nodosum was observed 13 times,* 9 times as a symptom complex associated with the onset of the primary focus and 4 times later in the course of the primary disease but with definite evidence of involvement of parenchyma and nodes on the x-ray picture. Therefore erythema nodosum occurred in 3.6 per cent of cases of active primary tuberculosis.

During the same period, Oct. 1, 1930, through Dec. 31, 1938, 325 consecutive cases of calcified primary pulmonary tuberculosis were studied. In this group there were only 3 cases of erythema nodosum, of which 2 patients have been mentioned previously who had acute rheumatic fever in association with the erythema nodosum. The third case was in a girl 9 years of age who had a large calcified primary focus and a caries sicca of the elbow and who had previously been observed with caseous tuberculous axillary nodes. During the course of a typical erythema nodosum her elbow became swollen and tender with a marked enlargement of the epitrochlear node. Within six months of the attack of erythema nodosum this girl developed chronic pulmonary tuberculosis. This case undoubtedly falls into Wallgren's postprimary group and by its nature bears out Ernberg's theory that erythema nodosum is due to a tuberculinization of the tissues of a sensitive individual.

In summary we have found that the total number of cases of erythema nodosum seen in three large hospital services in the United States is small compared to the numbers reported from northern continental Europe. In adolescents and adults the majority of cases seen in Boston and New York would seem to be due to infection other than tuberculosis. In the series reported from the children's wards of Bellevue Hospital 74 per cent of the children with erythema nodosum had positive tuberculin tests, three to four times the normal incidence, although in only 39 per cent of the cases could tuberculosis be considered definitely responsible for the erythema nodosum. In 362 patients over 2 years old with active primary tuberculosis, erythema nodosum oc-

*These include the 11 cases previously cited who were seen on the *wards* of the Children's Medical Service.

curred in 3.6 per cent. The symptom complex of erythema nodosum developed concomitantly with the primary tuberculosis in 2.7 per cent of the cases. It is possible that the apparent contradiction in the medical literature concerning the etiology of erythema nodosum may be due to the reporting of groups of patients of varying ages.

CONCLUSIONS

1. Every child with erythema nodosum should be regarded as potentially tuberculous but no case should be considered tuberculous without a complete study.

2. When erythema nodosum occurs in children with active tuberculosis it is commonly associated with the early phases of the disease.

3. Erythema nodosum may be an important aid in the diagnosis of tuberculosis in an individual case. In the United States it occurs so uncommonly that its usefulness as a diagnostic aid is much less than in northern Europe.

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CLINICAL OBSERVATIONS IN THE TREATMENT OF EPIDEMIC DIARRHEA OF THE NEWBORN

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THE recognition of epidemic diarrhea of the newborn as a clinical entity is recent; most of the literature relating to it has appeared within the past decade. In a few of the epidemics all of the affected infants survived, but in general there has been a significant mortality rate. Available statistics from various clinics indicate an average case fatality rate of 43.0 per cent (Table I). Although preventive measures should be the most important factors in reducing the mortality rate,[18, 22, 29, 31, 32, 33] it is the purpose of this paper to call attention to certain therapeutic measures which have been beneficial in the management of infants afflicted with this disease.

One of the problems in the control of epidemic diarrhea of the newborn is the establishment of the diagnosis. Often the first cases develop so insidiously that the possibility of epidemic diarrhea is not initially considered, and proper isolation is not provided until many other infants in the nursery have been exposed to the infection. In the immediate neonatal period the character and the number of stools for an infant may vary considerably and still not have clinical significance. During the period of transitional stools there is a tendency for loose and frequent stools, which has been attributed to irritation of the gastroenteric tract by the introduction of oral feeding and by the establishment of the bacterial flora. Deviations in the bowel habit may occur from overfeeding and from improper artificial feeding. The breast-fed infant frequently has stools postprandially. Drugs, laxatives, or food irritants ingested by the lactating mother may alter the character of the stools of her nursling. Diarrhea may be a symptom of parenteral infection or of enteritis caused by dysentery organisms. While the diagnosis and hence the disposition of the newborn infant with diarrheal stools create difficult problems in newborn nurseries, arbitrary decisions frequently must be made. In order to protect other infants, it would seem advisable to isolate an infant with diarrhea whenever any of the aforementioned conditions cannot be readily incriminated and to make a provisional diagnosis of epidemic diarrhea of the newborn whenever two or more infants are similarly affected.

In the latter part of August, 1943, some of the infants in the newborn nursery at Temple University Hospital had yellow, diarrheal stools without other evidences of illness. In retrospect, these infants may have

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TABLE I*

SUMMARY OF CASE FATALITY RATE OF EPIDEMIC DIARRHEA OF THE NEWBORN

HOSPITAL	NUMBER OF INFANTS ATTACKED	NUMBER OF INFANTS WHO DIED	CASE FATALITY RATE PERCENTAGE
The Cradle, Chicago[1]	88	27	30.7
Michael Reese Hospital, Chicago[2]	34	14	41.2
New York Hospital[3]	72	32	44.4
Memphis General Hospital[4]			47.0
Providence Hospital, Seattle[5]	23	14	61.0
Hospital for Sick Children, Toronto[6]	15	9	60.0
Knickerbocker Hospital, New York[7]	18	0	0.0
New York Hospital[8]	59	0	0.0
Queens County Hospital, New York[9]	26	17	65.4
Brooklyn Hospital, New York[9]	33	23	69.7
Morrisania Hospital, New York[9]	32	14	43.7
Royal Maternity Hospital, Edinburgh[10]	41	11	26.8
Germantown Hospital, Philadelphia[11]	5	0	0.0
New York Hospital[8]	13	2	15.4
Worcester Memorial Hospital[12]	6	5	83.0
New York hospitals[13, 14]	505	234	46.0
Genesee Hospital, Rochester, N. Y.[14]	12	7	58.0
New York Hospital[8]	13	0	0.0
Milwaukee Hospital[15]	22	18	81.8
General Hospital, Huntington, W. Va.[16, 17]	16	5	31.2
Germantown Hospital, Philadelphia[11]	11	3	27.3
Sydenham Hospital, New York[18]	52	15	29.0
New York hospitals[3]	711	335	47.0
In Teaneck, N. J.[19, 20]	20	11	55.0
Children's Hospital, Denver[21]	11	5	45.4
St. Louis County Hospital[20]	26	11	42.3
In Buffalo, N. Y.[20]	18	8	44.4
University of Pennsylvania Hospital[11]	14	0	0.0
New York hospitals[22]	750	356	47.5
Near Los Angeles, Calif.[23]	11	4	36.0
Simpson Maternity Hospital, Edinburgh[24]			70.0
Bronx Hospital, New York[25]	18	0	0.0
England,[26]			
Hospital A	27	5	18.5
Hospital B	83	25	30.0
Hospital C	29	11	38.0
Simpson Maternity Hospital, Edinburgh[24]			86.0
Bronx Hospital, New York[27]	19	0	0.0
Simpson Maternity Hospital, Edinburgh[24]			69.0
			10.0
Province of Ontario,[28]			
Hospital A	26	3	11.5
Hospital A	7	0	0.0
Hospital B	7	1	14.3
Hospital C	12	0	0.0
Hospital D	18	12	66.6
Ohio, 4 epidemics[29]	112	47	42.0
Indianapolis, Indiana[30]	11	2	18.2
	11	4	36.4
Temple University Hospital	28	1	3.6

*This table is arranged chronologically in so far as possible.

represented the first cases in an epidemic of diarrhea of the newborn which occurred in September, 1943.

When an infant who had had loose stools during the transitional period became critically ill and other infants in the nursery developed loose stools, it was realized that these infants had a serious diarrheal disturbance which should be considered as epidemic diarrhea of the

newborn. The entire obstetric department was closed to new admissions and a temporary obstetric unit for new admissions was established on another floor, from which the nurses and the physicians who were responsible for the ill infants were excluded. The critically ill infant had been removed to a private room and was attended by special nurses. The remainder of the infants were divided into two groups, those with diarrheal stools and those exposed but not attacked; they were kept in adjacent but noncommunicating nurseries and cared for by separate groups of nurses. As soon as an infant developed diarrhea, he was transferred to the nursery containing the ill infants. The parents of infants recently discharged from the nursery were advised of the exposure to the disease and of the necessity of early medical care if diarrhea developed; daily contact was maintained with these families by members of the hospital staff.

Among seventy-six full-term infants who were exposed to the infection twenty-eight developed the disease, a morbidity rate of approximately 37 per cent. Four of these infants received treatment elsewhere. Among nine premature infants in an adjacent premature nursery, four developed the disease. All of the cases were diagnosed clinically within a period of seven days; most of them developed on the third and the fourth day after quarantine. The age of the full-term infants who developed diarrhea in the nursery ranged from 3 to 14 days at the time of the onset of diarrhea, and the average age was 6.4 days. Among the total of twenty-eight infants who were treated for epidemic diarrhea of the newborn, seven were classified as critically ill, eight as seriously ill, eight as moderately ill, and five as mildly ill. Twenty-three of the infants developed diarrhea while in the nursery and five were readmitted to the hospital within a few days after dismissal from the nursery apparently in satisfactory condition. Among the twenty-eight infants there was one death, that of a 17-day-old premature infant. Unfortunately, permission for autopsy was refused.

Fifty-four stool specimens from twenty-six of the twenty-eight infants who had diarrhea were examined. Fifty-two stool specimens were also obtained from twenty-eight normal infants of the same age group. Special search was made for pathogenic types of streptococci, staphylococci, and enteric bacilli and for *Pseudomonas pyocyanea*. The only organism of possible significance isolated with any degree of regularity was a late lactose-fermenting, gram-negative bacillus which was identified biochemically as a para-aerogenes type of paracolon bacillus.[34] This biochemical type was recovered on eleven occasions from nine of the infants who had diarrhea and on one occasion from a normal infant. It was demonstrated later, however, that the organism isolated from the normal infant was not related serologically to the other isolations.

Agglutinative studies upon the serologic relationships of these para-aerogenes organisms demonstrated the existence of two antigenic groups,

one containing seven, the other four, of the strains. Sera collected two to four weeks after the onset of the illness from seven of the infants who had had diarrhea and from three of the normal infants showed no evidence of specific antibody.

In general, the clinical course was less severe when the weight loss was not marked. The infants who were readmitted to the hospital with diarrhea a few days following discharge from the nursery apparently in satisfactory physical condition had, as a group, more severe weight loss and were more seriously ill than those who developed diarrhea while still in the hospital. An exception to this is the weight curve for the infant who first developed diarrhea in the nursery; it resembles the weight curves for the infants who developed diarrhea after they were discharged from the nursery. The marked decrease in weight in this instance undoubtedly reflects the delay in instituting replacement therapy. Representative weight curves for the two groups of infants are shown in Figs. 1 and 2. These curves are drawn to the same scale and are expressed as per cent of weight deviation from a base line of the birth weight. It should be noted that in many instances a weight loss had preceded the development of other clinical symptoms and, if appre-

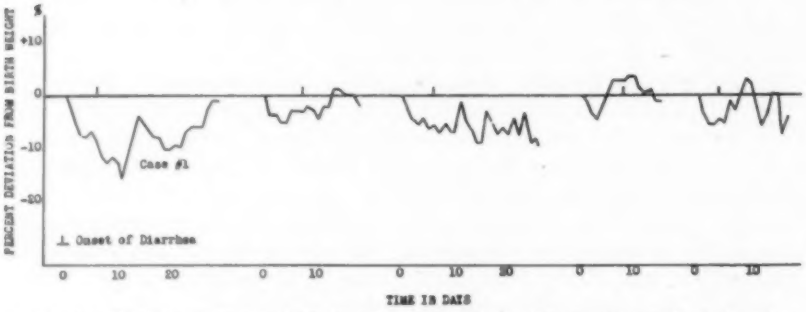

Fig. 1.—Weight curves for infants who remained in the nursery and developed diarrhea.

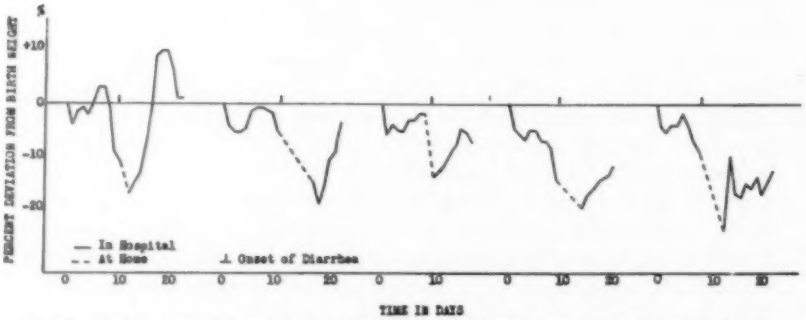

Fig. 2.—Weight curves for infants discharged from the nursery and readmitted with diarrhea.

ciated, might have warned of the oncoming illness. In all but one instance the temperature was never higher than 101° F. and it exceeded 100° F. in only six instances.

The plan of treatment consisted of substitution of a modified oral feeding* for milk feeding, administration of additional fluids subcutaneously and intravenously, correction of states of acidosis by parenterally administered alkali, and oral administration of synthetic ascorbic acid and thiamine chloride.* All infants, attacked and exposed, received succinylsulfathiazole in a dosage of 1 grain every four hours for the duration of the hospital period. Several of the infants received transfusions of blood or plasma.

During the acute phase of the epidemic the laboratory facilities were available day and night for the determination of carbon dioxide levels of the blood, and a physician was in constant attendance in the nursery.

The outstanding feature in the seriously ill infants, in addition to the excessive and explosive diarrhea and the general evidences of toxicity, was the low carbon dioxide combining power of the blood. Such determinations were obtained from affected infants initially and repeatedly whenever there was any significant abnormal manifestation. The criteria included listlessness, restlessness, failure to gain weight or loss of weight, cherry red lips, hyperpnea, and diarrheal stools. In some instances the restlessness was so extreme that the rubbing of the knees or the heels against the bed linen resulted in the production of ulcers in both locations. Hyperpnea was observed in only two infants. Among 102 carbon dioxide determinations obtained from infants who presented one or more of these indications the carbon dioxide combining power was thirty-five volumes per cent or less in fifty instances (Table II). With correction of the acidosis by the intravenous administration of 5 per cent solution of sodium bicarbonate or by the intravenous and/or subcutaneous administration of M/6 sodium lactate solution, in calculated amounts,‡ clinical improvement was evident either during the

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*

Formula A		*Formula B*	
Glucose	1 oz.	Glucose	1 oz.
Ringer's solution	20 oz.	Casec	¼ oz.
		Appella powder†	1 oz.
		Ringer's solution	20 oz.

Formula C		*Formula D*	
Glucose	1 oz.	Glucose	1 oz.
Appella powder	1 oz.	Appella powder	1 oz.
Skimmed milk	5 oz.	Skimmed milk	10 oz.
Ringer's solution	15 oz.	Ringer's solution	10 oz.

Two ounces of respective formula offered every four hours.

Two ounces of sterile water containing 25 mg. of ascorbic acid and 0.5 mg. of thiamine chloride between the formula feedings.

†Appella apple powder manufactured for Frederick Stearns & Company, Detroit, Mich.

‡Grams of sodium bicarbonate = CO_2 deficit§ × weight in kg. × 0.026 (administered in 5 per cent solution)

Cubic centimeters of molar sodium lactate = CO_2 deficit§ × weight in kg. × 0.3 (diluted with 5 additional volumes of distilled water and administered in M/6 solution)

§CO_2 deficit = Normal CO_2 combining power (55 volume per cent) − CO_2 determination in volume per cent.

TABLE II

CARBON DIOXIDE DETERMINATIONS

CO_2 COMBINING POWER (VOL. PER CENT)	NUMBER
Less than 10	5
10 to 15	2
15 to 20	5
20 to 25	7
25 to 30	10
30 to 35	21
35 to 40	16
40 to 45	28
More than 45	8

treatment or shortly thereafter. Sodium bicarbonate was employed preferentially when the carbon dioxide combining power was extremely low. The carbon dioxide determinations were checked a few hours later, and if the carbon dioxide combining power had not been restored to the normal range, the administration of alkali was repeated.

Milk feeding was discontinued and feeding of glucose water (formula A*) substituted during the phase of severe diarrhea. As the character of the stools showed improvement, the infant was given a weak formula without milk (formula B*), then a formula with skimmed milk (formulas C* and D*) and finally a weak evaporated milk formula before he was dismissed from the hospital. The subsequent course of all of the infants has been satisfactory.

DISCUSSION

An adequate evaluation of the various procedures employed in the treatment of epidemic diarrhea of the newborn is complicated by several factors. The first and most obvious of these is the marked variation in clinical severity not only in different epidemics but among infants in the same epidemic. This variation among the infants was certainly evident in this epidemic. While in several instances there was the impression that the therapeutic procedures employed were life-saving, in others it was evident that the infection was not a mortal one. A second factor complicating appraisal is the obvious impossibility of establishing comparable controls. The selection of alternate cases is not an adequate method because of the marked variability in clinical severity. Such a large number of infants would be required in order to establish significant differences in the patterns of response that no hospital nursery could supply enough cases even if all of the infants were affected. A better appraisal could be obtained by selecting cases of apparently equal clinical severity and comparing those specifically treated with those not so treated. Even this method fails because of the variations in the onset in relation to the subsequent severity of the infection. Lastly, certain of the procedures could not be omitted justi-

*See footnote, page 323.

fiably, even for the comparison of therapeutic efficacy. Chief of these is the administration of fluids. In our series there were no controls so that the deductions made are entirely dependent upon clinical impression.

The need for parenteral fluids was apparent from the marked loss of fluid from the bowel, the loss of weight, and the dehydration which was reflected by the poor turgor of the skin and the loss of subcutaneous tissue. The dangers attendant to dehydration, such as loss of kidney function, acidosis, and so-called medical shock, are generally recognized. That in a few instances the infants were overhydrated from too much water, too much sodium chloride, or too little plasma and blood was reflected by peripheral edema and by undue weight gain (Figs. 1 and 2). This phenomenon may also be related to the inadequacy of kidney function in the newborn infant. No serious difficulties were encountered in this respect, but it serves to emphasize the importance of utilizing some laboratory method as a measure of blood viscosity, rather than mere clinical impression, as a guide to both the quantity and the type of fluid to be administered. However, there is no doubt that the administration of fluids (sodium chloride in physiologic solution, Ringer's solution, glucose in saline solution or in water, amino acid solution, blood, plasma) was not only important but essential for the seriously ill infants.

The importance of acidosis was evident from the frequency with which low carbon dioxide levels of the blood were obtained. Johnson and Rothman[23] and St. Geme[35] have reported that acidosis precedes the development of the diarrhea, and a number of observers[8, 11, 13, 15, 19, 20, 22, 23, 35, 36, 37] have commented that acidosis occurs during the toxic stage of the disease. The appraisal of the role of alkalis in the correction of acidosis, however, is not definite. It is well known that the body has a marked capacity to reestablish acid-base equilibrium when fluids are replaced in appropriate amounts. The question has not been satisfactorily answered, however, whether there exist states of acidosis which, if uncorrected and allowed to persist or to increase, would result in irreversible change and hence in death. Such a consideration is an hypothetic one, and an adequate answer is dependent upon more comprehensive data than are available. Nevertheless, the marked and rapid improvement which was manifested clinically by the infants who had their low carbon dioxide combining powers raised to the normal range by the parenteral administration of alkalis was impressive.

Two items seem particularly worthy of emphasis in respect to the determination of the need for the parenteral administration of alkali. These are (1) the failure of many of the infants who had low plasma levels of carbon dioxide combining power to have the classical picture of acidosis, and (2) the rapidity with which a "corrected carbon dioxide" could be dissipated. This latter fact emphasizes the need for "twenty-four-hour" observations and laboratory determinations and

the prompt correction of the low carbon dioxide of the blood during the acute phase of severe diarrheal disturbances in newborn infants.

Other factors in the treatment of these infants included the initial withholding of oral feeding other than glucose in Ringer's solution, synthetic ascorbic acid and thiamine chloride, and succinylsulfathiazole. Since all of the attacked infants as well as all of the exposed infants received succinylsulfathiazole, its role cannot be evaluated in this series. There are several reasons, however, to justify caution in attributing any effect to this drug. First of all, in our series some of the exposed infants who received the drug developed the disease and some of the attacked infants had relatively long clinical courses. Second, the data of Light and Hodes[38] are in favor of a virus as a causative agent. While there is need for further confirmation, their evidence is the best at hand in support of a specific etiologic agent. If the infecting agent should be a virus, there is little reason to expect that a sulfonamide would be effective. This, of course, is not an argument against the use of the drug,[30] but more definite data in relation to its efficacy are necessary.

SUMMARY

In an outbreak of epidemic diarrhea of the newborn involving twenty-eight infants, there was one death, that of a premature infant.

A low carbon dioxide combining power of the blood was observed in 50 per cent of the instances in which abnormal clinical manifestations were noted in the affected infants, most of whom did not exhibit the classical picture of acidosis.

Significant clinical improvement attended the correction of the acidosis by the parenteral administration of 5 per cent solution of sodium bicarbonate or of M/6 sodium lactate solution.

Other therapeutic measures included the modification of the oral feeding, the oral administration of ascorbic acid, of thiamine chloride, and of succinylsulfathiazole, and the parenteral administration of fluids.

The control of the epidemic was materially affected by the isolation procedures employed.

Emphasis is placed on the importance of constant observation of the ill infants and on the determination of the carbon dioxide level of the blood, whenever there are evidences of increasing severity of the disease with or without the usual manifestations of acidosis.

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NEUROMYELITIS OPTICA

Report of a Case

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THE combination of spinal cord and optic nerve fiber lesions occurring simultaneously and resulting in paraplegia and blindness suggests a syndrome with which the pediatrician should be familiar. This bizarre combination, although not infrequently reported in the literature, strikes one as being both sufficiently rare and interesting to be reported upon here.

Evidence of coexisting spinal cord disease and optic neuritis has been found and described in a variety of clinical conditions, namely, multiple sclerosis, encephalomyelitis, cerebrospinal syphilis, disseminated tumors of the spinal cord, septicopyemia, and neuromyelitis optica.[1]

The purpose of this presentation is to describe the clinical and pathologic features of neuromyelitis optica and to contrast it with diseases resulting in a similar clinical pattern.

A case is presented below, and neuromyelitis optica is suggested as the most likely clinical diagnosis.

L. D. (BCH No. 1041374), a white girl 8 years of age, was admitted to the Pediatric Service of the Boston City Hospital Sept. 29, 1941, because of blindness and paralysis. She had been well until three weeks prior to admission at which time she was ill with a mild upper respiratory infection. She recovered from this illness and was attending school. Three days prior to entry, while in school, her teacher noticed that she was drowsy, disinterested, and acting generally at variance with her normal behavior and sent her home. When she arrived home, she complained of abdominal pain and some dimness of vision. A doctor was called, and in the interim before he arrived the mother found on attempting to undress the child preparatory for bed that she had difficulty raising her legs and complained of low back pain. She also found on offering the child a glass of milk that the child could not locate the proffered glass at all but groped blindly for it. The doctor arrived and found the child fairly comfortable in bed. Her temperature was 99.6° F. orally. Some temporary improvement in vision must have resulted by the time he arrived, because the doctor was not impressed, apparently, with either the visual disturbances or the loss of power in the lower extremities. He made the diagnosis of mild pharyngitis and prescribed the usual nonspecific therapy. The loss of vision progressed rapidly until only perception of light and dark remained by the following day. Similarly, on the following day, two days before entry, backache became more prominent and severe, stiffness of the neck developed with pain on flexion, and weakness and loss of muscular power in the lower extremities had become quite obvious. Finally, the day of entry and the third day of the disease, the patient was seen by one of the members of the staff of this hospital,

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who recognized the presence of coexisting blindness and paraplegia, and referred her for admission to the Pediatric Service of the Boston City Hospital.

On arrival at the hospital on Sept. 29, 1941, the patient complained bitterly of pain all along the lumbosacral spine, stiffness of the neck with marked pain on flexion, extreme pain on raising herself to the sitting position, lower midabdominal pain, pain referred down both lower extremities, and almost complete loss of vision. For the first time, on this day, she had experienced pain and difficulty in passing urine. She had not had any headache, nausea, vomiting, dizziness, or tinnitus.

Her family history was essentially noncontributory. She is the sixth of eight living children, one of whom has rheumatic heart disease, and another is deaf as a result of measles during infancy. Two siblings died of scarlet fever and diphtheria, each complicated by pneumonia. Both parents are living and well. There is no history of tuberculosis or familial diseases.

Her birth was normal and at term. Birth weight was 7 pounds, 4 ounces, and no cyanosis, paralysis, or convulsions occurred during the neonatal period. Her development was apparently normal as gauged by the age at which she sat up, teethed, walked, and talked.

She had the following childhood diseases: measles, mumps, chicken pox, and scarlet fever. She has experienced frequent bouts of spontaneous epistaxis, but has had no chorea, arthralgia, or repeated attacks of sore throat. She had a cervical abscess incised and drained at one year of age and a tonsillo-adenoidectomy at 2 years of age.

Physical examination on admission on Sept. 29, 1941, revealed a mentally clear but emotionally distraught white girl. Her face was flushed and she appeared painfully ill. She objected to any manipulation, particularly attempts to have her sit up or to flex her neck. Her temperature was 99.6° F. orally, and her blood pressure was 108/70. Her neck was rigid and attempted flexion caused pain as well as bilateral reflex flexion of her thighs on her abdomen. Her pupils were dilated equally, regular, and reacted sluggishly to light, but did not react to accommodation. Vision was obviously reduced by gross tests; large objects could be perceived but not described. As a matter of fact, the extent of visual perception seemed to be limited to the ability to distinguish between light and dark. There were no eye muscle palsies or nystagmus. The pharynx was moderately injected. A soft apical systolic murmur was present. There was no evidence of cardiac enlargement. In the lower midabdomen just above the symphysis pubis, a rounded, firm, tender mass was palpable which was dull to percussion. This was felt to be a distended urinary bladder, and catheterization confirmed this impression. Neurologic examination showed, in addition to eye changes already noted, definite motor weakness in both lower extremities, the patient being unable to lift either leg from the bed against slight pressure from the examiner's hand. Deep and superficial abdominal reflexes were absent, and biceps, triceps, radials, patellar, and Achilles tendon reflexes were hyperactive bilaterally. There were bilateral positive Babinski, and Brudzinski reflexes. Unsustained ankle clonus was present bilaterally also. Generalized hyperesthesia existed over both lower extremities with no loss of positional or vibratory sense. Ophthalmoscopic examination showed absence of the physiologic cupping of the optic nerve heads and engorged retinal vessels bilaterally.

The following laboratory data were obtained on admission. Lumbar puncture revealed slightly turbid fluid not under any increased pressure. Microscopic examination of the fluid showed it to contain a total of 294 cells, 69 of which were polymorphonuclear leucocytes and 225 were lymphocytes. There was a slight increase in the protein content to 52 mg. per cent and a gold sol curve of 00110000. The blood studies were essentially normal except for a white blood count of 21,700 with 68 per cent polymorphonuclear leucocytes. Uncatheterized urine specimens were

completely negative. Blood and spinal fluid cultures and serology were negative. Tuberculin test (1:1000 old tuberculin) was negative.

Clinical course was as follows: Her temperature returned to normal the following day and remained so except for a rise to 100° F. orally on the fifth and eleventh hospital days. Her visual loss remained stationary being practically complete, and the paresis progressed until complete paralysis of both lower extremities resulted. Various paresthesias appeared and extended up onto the abdomen. Rectal and urinary incontinence (as well as urinary retention requiring catheterization) developed. Improvement was first noticed on the third hospital day. At this time the patient exhibited a loss of irritability which had been previously present, and a sense of well-being appeared concomitantly with improvement in vision. Visual return was dramatic and rapid, gross objects could soon be described, fingers could be counted from a distance of two to three feet, and some evidence of color discrimination was apparent. The following day, the fourth day, sphincter control was regained and catheterization was no longer necessary. Coincident with the visual recovery return of muscular power began to occur in the lower extremities and was rapid and progressive until the twenty-fourth hospital day at which time the use of both lower extremities had been regained, except for left toe drop which disappeared nine days later. Ophthalmoscopic consultation on the sixth hospital day revealed vision limited to counting three fingers from a distance of three to five feet, slightly blurred discs with some edema nasally, and overfilled and tortuous veins. The picture of the eye grounds (in view of the spinal fluid findings and evidences of cord changes) was felt to be compatible with the diagnosis of neuromyelitis optica. Neurologic examination on the seventh hospital day corroborated the neurologic findings as stated, improvement was noted, and it was felt that "signs and symptoms were those of a diffuse involvement of the nervous system in the nature of a disseminated encephalomyelitis. The localization (of the) process in the optic nerves and spinal cord was similar to that seen in the so-called neuromyelitis optica. . . ."

Visual and muscular recovery was progressive. The patient sat up on the thirty-eighth hospital day and walked without aid one week later. Vision was normal to gross examination and fundi appeared normal. The patient left the hospital improved after a total stay of fifty-one days. She was referred to the eye clinic in the outpatient department for determination of visual fields and routine follow-up.

Laboratory studies are shown in Table I.

Urine examinations were consistently negative, and blood studies revealed essentially normal values.

TABLE I

SPINAL FLUID

DATE	SEPT. 29, 1941	OCT. 1, 1941	OCT. 3, 1941
Pressure	? normal	110 mm. HOH	110 mm. HOH
Clear	Slightly turbid	Clear	Clear
Color	Slightly yellow	Colorless	Colorless
Clot	None	None	None
White blood cells	294	74	116
Polymorphonuclears	69	9	37
Lymphocytes	225	63	79
Red blood cells	0	0	0
Protein	52 mg.	25 mg.	28 mg.
Sugar	50 mg.	52 mg.	45 mg.
Chlorides	729 mg.	688 mg.	Qns.
Gold sol	00110000	00000000	--------
Wassermann	Negative	--------	--------
Culture	Negative		

The case presented here is considered clinically to be one of neuromyelitis optica because of the following reasons: (1) the extreme youth of the patient, (2) the dramatic onset with blindness and paraplegia, (3) the coincidental involvement of the optic nerves and tracts and the spinal cord by the pathologic process, (4) the spinal fluid pleocytosis associated with a negative gold sol curve, (5) the absence of any localizing infectious process anywhere else in the body, (6) the dramatic recovery and apparent cure.

This patient was seen again in both the pediatric and eye outpatient departments of this hospital April 2, 1944, two and one-half years after her illness. She had not been ill since she was discharged from this hospital. She was then 11 years of age, was in the fifth grade at school, and had never been kept back except the year of her illness. She was well developed physically, weighed 79 pounds, and was 57 inches tall.

Physical examination revealed the following findings, the conjunctivae were injected and granular with some crusting and scaling of lid margins; a soft apical systolic murmur was heard, but there was no evidence of cardiac enlargement; all reflexes were equally hyperactive: biceps, triceps, radials, patellars, and Achilles tendon. No pathologic reflexes were present. Hyperesthesia, disturbance in pain, temperature, positional, or vibratory sense could not be demonstrated. There was no ataxia, asynergia, or nystagmus. Blood pressure was 104/72 and urine examination was negative.

Eye examination revealed 20/30 vision in each eye. There were no eye muscle palsies or weakness present. Pupils were equal, regular, and reactive. Fundi were normal except for slight temporal pallor of the optic discs bilaterally. Visual field determinations showed essentially normal range of vision in all fields except for slight enlargement of the blind spot of both eyes, especially the left.

DISCUSSION

Historical.—Albutt[2] first observed the occurrence of optic neuritis with myelitis in 1870, and described ophthalmoscopic findings of blurring of disc margins, slight hyperemia, and atrophy of the disc in several of his cases of myelitis. Erb,[3] in 1880, emphasized the occurrence of the neuritis with myelitis, but it was not until 1894 that Devic, in his "These de Lyon," reported several cases collected from the literature in addition to his own and attached the name of *neuromyelite optique* to this peculiar syndrome.

Clinicopathologic Diagnosis.—Though neuromyelitis optica is but one of a large group of demyelinizing diseases of the central nervous system, certain definite features of its underlying histopathologic anatomy, coupled with its fairly consistent clinical pattern, permit its differentiation from the other members of the group with which it is most likely to be confused (namely, multiple sclerosis and encephalitis periaxialis diffusa), and warrant its consideration as a distinct nosologic entity.[1]

Neuromyelitis optica is a term applied to certain neurological cases in which optic neuritis is associated with transverse or disseminated myelitis[4] and which is manifested clinically by sudden loss of vision and paraplegia. The disease may occur at any age but is commoner in

the early decades of life. It is usually not considered familial in nature, but its occurrence in identical twins recently has been reported.[5] No difference in sex incidence has been found, but reviewing reported cases gives one the impression of a preponderance of cases reported as occurring in females.

A history of an antecedent or concurrent upper respiratory infection is the rule rather than the exception. Constitutional symptoms are not uncommon at the inception of the disease but are rarely alarming. The temperature may be elevated slightly and complaints of sore throat, headache, and vague, poorly localized aches and pains, particularly in the back and lower extremities, are frequently described. Usually several days later, rarely weeks later, a fulminating course develops, heralded by grave signs of central nervous system involvement (namely, blindness and/or paraplegia, either occurring initially, but followed by the rapid development of the other in a matter of from a few hours to two or three days). There is no general agreement as to the most common mode of onset. Beck[6] reported an onset with paraplegia in thirty-six out of seventy cases, approximately 53 per cent, while loss of vision occurred initially in only 26 per cent of his series. On the other hand, Gouldon,[7] reported loss of vision occurring initially in 80 per cent of his cases.

Although involvement of one eye alone occurs, bilateral and simultaneous involvement is more commonly observed, resulting in varying degrees of impaired vision ranging from central scotomas and contracted visual fields to mere perception of light and even total blindness.

The loss of vision is rapid, occurring in the course of a few hours or a few days. The pupils are dilated and sluggish in reaction to light. It has been suggested that a relationship exists between the degree of pupillary dilatation and the degree of impaired vision; the greater the dilatation, the greater the visual loss.[8] Nystagmus and extraocular palsies are not a common feature of this disease, and, if more than transiently present, casts doubt upon the reliability of the diagnosis of neuromyelitis optica. Ophthalmoscopic findings may vary from a normal-appearing fundus, to one showing the classical signs as set forth by Albutt[2] over one-half century ago, namely, blurring of disc margins, slight hyperemia, and atrophy of the disc. Charting of visual fields generally yields evidence of concentric constriction and large central scotomas. Often vision is so reduced that charting of fields is impossible. Visual recovery usually begins several days to weeks later and improvement may take place progressively and gradually, though occasionally rapid recovery has been observed. Though vision is frequently permanently impaired, complete recovery is not unheard of.

Paraplegia, as stated previously, may either usher in the clinical picture, or follow the optic neuritis. McAlpine[5] states that the dorsal cord is the first portion to be attacked in the majority of cases. This

initial localization of the invading process probably accounts for the developing clinical picture. Pain, referred to the back and down the legs, is usually the first symptom. This pain is ofttimes described as sharp and lancinating. Various parathesias make an early appearance, most common of which are numbness and tingling beginning in the toes and feet and spreading upward over the abdomen. Sensory disturbances are variable and the loss differs little from that observed in acute myelitis of any other cause. The upper level of sensory loss usually extends to the nipple line with hyperesthesia above that point. A dissociated sensory loss has been reported in which pain and temperature alone were involved.[8] When this occurs it usually merely precedes the involvement of the fibers concerned with mediation of light and deep tactile sensation. Paresis of the lower extremities follows closely after the afore-mentioned early complaints and progresses to complete paralysis in a matter of a few hours or days. Once developed, paraplegia is progressive until either death or recovery: there being no corollary between it and the remitting character of the visual disturbances.[6] In the acute cases the deep tendon reflexes are markedly depressed or absent completely, whereas in the more insidious type of onset the reflexes may at first be exaggerated and hyperactive. If paralysis lasts long enough, muscular atrophy will result. Urinary retention is usually an early associated feature of the disease, and rectal sphincter disturbances may also develop. Recovery, if it is to occur, begins from several days to weeks later, and may be complete. There is, however, generally residual damage. Respiratory failure is the cause of death. This is not medullary failure but rather respiratory failure due to involvement of the phrenic nerve fibers from the cervical cord, resulting in diaphragmatic paralysis. Some involvement of the cervical cord results in practically every case,[5] although the immediate mortality is in the vicinity of 50 per cent.

Cerebrospinal fluid, in the majority of instances, shows fairly consistent polymorphonuclear pleocytosis, increased protein content, and constantly negative Lange colloidal gold curve. The association of a negative Lange curve and pleocytosis appears characteristic of neuromyelitis optica.[5]

The distinctive pathologic feature of neuromyelitis optica is a selective demyelinization affecting the optic nerves and tracts, the optic chiasma, and spinal cord, while sparing the brain and brain stem. Demyelinization of whole nerve bundles, destruction of axis cylinders, simultaneous involvement of white and gray matter (the gray as constantly and severely as the white), and even involvement of the ganglion cells of the anterior and posterior horns of the cord as well as the nerve fibers[1] constitute the picture. Necrosis and cavitation of the cord are conspicuous features in the cases of diffuse myelitis. Histologically, myelin sheaths are destroyed and microglial proliferation, as evidenced by the

presence of compound granular cells, occurs. There is very little astrocytic response or perivascular infiltration.

Differential Diagnosis.—As previously stated, Schilder's disease and multiple sclerosis are most likely to be confused with neuromyelitis optica. However, conditions such as diffuse encephalomyelitis and brain tumor are suggestive enough at times to warrant inclusion in any differential diagnosis. Such rare conditions as the various familial types of diffuse scleroses will be dismissed from further consideration by the mere mention of them.

1. Schilder's disease, or encephalitis periaxialis diffusa, merits considerable attention directed toward its differentiation from neuromyelitis optica. It, too, is an acute demyelinizing disease of the central nervous system involving particularly, and almost exclusively, the white matter of the brain. Significant, too, is the absence of involvement of the spinal cord. Thus, it should be readily appreciated that the localization of the pathology of the two diseases makes any clinical similarity seem more apparent than real, and a critical evaluation of the clinical findings will prove them to be vastly dissimilar. And so, though rapid onset of blindness and paraplegia characterize both diseases, the blindness in Schilder's disease is cerebral in type due to occipital lobe demyelinization and results in blindness with retention of pupillary reflexes; whereas in neuromyelitis optica the blindness is due to direct involvement of the optic nerve fibers, tracts, and chiasma and usually results in widely dilated pupils reacting only sluggishly to light. Likewise, the paraplegia in Schilder's disease is spastic in type due to demyelinization involving the region of the internal capsule, while in neuromyelitis optica the paraplegia is flaccid and due to involvement of the anterior horns of the spinal cord. Similarly, other associated cerebral findings of central deafness and mental deterioration, common to Schilder's disease, due to an extension of the pathologic process to the temporal and frontal lobes respectively, finds no counterpart in neuromyelitis optica where widespread cerebral lesions do not occur. Therefore, with the above facts clearly in mind, too much difficulty should not be encountered in an attempt to distinguish one disease from the other.

2. Multiple sclerosis is also a demyelinizing disease of the nervous system which may, in the acute form, present a clinical picture similar to neuromyelitis optica. More generally, however, an insidious onset is seen and such cases are fairly easily distinguished from neuromyelitis optica. The acute onset, however, with visual disturbances and paraplegia may be confusing.

Rarely does multiple sclerosis strike dramatically and with the precise symmetry of neuromyelitis optica. More commonly, when optic neuritis and signs of muscular paresis coexist, the neuritis is likely to be unilateral and the paresis takes the form of a monoplegia, or, if a paraplegia, it is one of unequal loss of power. Although unilateral

optic neuritis is frequently seen in multiple sclerosis, rarely is bilateral optic neuritis encountered. Rarer still is the association of bilateral optic neuritis with myelitis, and, as a matter of fact, their simultaneous occurrence is practically unknown in multiple sclerosis.[9] Other prominent clinical features, such as euphoria, ocular palsies, cerebellar dysfunction, and sensory disturbances, testify to the disseminated nature of the lesions throughout the brain, optic nerves and chiasma, cerebellar peduncles, and spinal cord. The microscopic pathology is essentially one of patchy demyelinization of the white matter with conspicuous reactive gliosis. The process is so widespread throughout the nervous system that some part of the pyramidal system is caught and a spastic type of upper motor neurone lesion results. The notoriously remittent character of the disease is due to the preservation, until the late stages, of the axis cylinders intact; even those contained within the sclerotic patches are spared in the beginning of the disease.

Further differential criteria exist in the age incidence and certain spinal fluid findings. Extreme youth (under 15 years of age) of itself is generally considered to preclude the diagnosis of multiple sclerosis from serious consideration. Wechsler[10] states that multiple sclerosis rarely occurs in childhood. Ford[11] states that "it scarcely seems necessary to enter upon a discussion of disseminated or multiple sclerosis in an article devoted to diseases of childhood, for this condition rarely develops before the age of puberty." He states a personal observation of a case developing bilateral central scotomata at the age of 10 years which soon remitted, to be followed three years later by spasticity of the legs, cerebellar ataxia, nystagmus and scanning speech. It is his opinion that rarely symptoms of multiple sclerosis may appear before puberty, but he doubts whether the typical clinical picture ever develops before this age. And lastly, the examination of the spinal fluid may offer some positive information directed toward the confirmation of the diagnosis of multiple sclerosis. The presence of an abnormal Lange colloidal gold curve has been reported to have been found in 71 per cent of the 839 cases of disseminated sclerosis on whom an analysis of the spinal fluid was carried out.[12] The spinal fluid chemistry is otherwise negative and a normal cell count is usually found, though occasionally a mild lymphocyte increase may occur. By contrast, the Lange colloidal gold curve is normal in neuromyelitis optica, and a slightly increased globulin content and a polymorphonuclear pleocytosis prevails.

The diagnosis of multiple sclerosis, reported as occurring in children, should be viewed with suspicion, and in all likelihood, is either neuromyelitis optica, Schilder's disease, familial extra-pyramidal tract disease, such as progressive cerebellar ataxia,[13] or the rare case of familial diffuse sclerosis, such as Merzbacher-Pelizaeus disease.[14]

3. Acute disseminated encephalomyelitis, either spontaneous or post-infectious, shows more widespread lesions through the hemispheres and

results in a clinical picture not easily confused with neuromyelitis optica. Blindness is considered rare in this condition, and the course of the disease is much shorter. Pathologically, foci of acute demyelinization scattered throughout the nervous system with consistent and distinct perivascular distribution characterize the disease.[1, 5, 14] Evidence of inflammatory reaction, perivascular microglial proliferation, and some attempts at gliosis are associated phenomena and are at variance with the pathology of neuromyelitis optica.

4. The erroneous diagnosis of brain tumor may be entertained at times, because of the presence of papilledema and motor weakness. However, if careful attention is paid to an accurate history, to the dramatic and sudden loss of vision, to the large central defects in vision associated with the choking of the discs, and to the absence of the other clinical signs of increased intracranial pressure, this diagnostic error need not be made.

Prognosis.—The disease may be fulminating in intensity and result in death in a few days or recovery may occur after from two to three months or more in cases of less intensity. The mortality is variously stated at around 50 per cent. With recovery, subsequent attacks may occur and prove fatal. Most cases fail to survive the third attack.[11] Recovery, when it occurs, usually results in residual loss of vision and muscular power.

SUMMARY

1. A case of paraplegia associated with bilateral optic neuritis is reported with the clinical diagnosis of neuromyelitis optica.

2. A clinicopathologic discussion of neuromyelitis optica is presented, calling attention to its clinical similarity to other demyelinizing diseases of the nervous system.

3. An attempt is made to differentiate neuromyelitis optica clinically from other allied disorders.

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CONGENITAL HEREDITARY LYMPHEDEMA (MILROY'S DISEASE)

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TWO cases of congenital, hereditary lymphedema have been observed at the Milwaukee Children's Hospital and I believe that a report of these cases, with a short review of the literature might further the knowledge and may bring us nearer to the answer of the question of etiology and treatment.

History and Literature.—The first description of the condition was made by Nonne[1] in 1890 in Germany. The first report in this country was made by Milroy[2] in 1892, and the definition of "chronic hereditary edema" was formulated in his report. Osler[3, 4] mentioned the condition as being described by Milroy. He was the first to call it "Milroy's disease." Meige[5] reported the condition in 1898, in France. Since that time several authors have reported cases, and Milroy[6] himself has presented his observation on the same family thirty-five years later with a general discussion of the conception of the condition at that time. Stoesser[7] reported a case in 1928 and discussed the condition in general. In 1933, Faber and Lusignan[8] made a rather complete study and reported one case. In the same year Ellis and Hall[7] reported several cases of several generations and made the most complete laboratory investigation.

An observation of 300 cases of "lymphedema" at the Mayo Clinic by Allen and Ghormley[10] in 1935 revealed not a single case of Milroy's disease; however, the authors did not include cases of the late-occurring type or single cases, where heredity could not be proved.

In 1940, a case of Milroy's disease of the upper extremity was described by Herzberg[11] and several generations have been followed by Dassanayake.[12] The same year an analysis of the condition was made by Rosenberg[13] and cases divided in two groups, those whose onset dates back to birth and those which appear first in early adult life. The occurrence of congenital anomalies on the same patient was emphasized. Bloom[14] described a family in 1941 and also emphasized there the simultaneous occurrence of a familial anomaly of the eyelid. In his cases the repeated occurrence of painful attacks and the frequent mentioning of "infection" is remarkable; however, the factor of heredity is obvious. In 1942, a case with inflammatory attacks was reported by Stern.[15] The family history revealed a definite hereditary tendency. This short review of the literature shows the rarity of the condition.

Although the literature on Milroy's disease is not extensive, some more reports have been studied. Mention of the entire literature has not been made because some reports describe only the condition without adding new information; others bring cases, but without sufficient evidence that they belong under our heading.

Nomenclature.—The condition is usually called Milroy's disease. It is also known as Nonne's or Meige's disease or as hereditary edema, trophedema, or congenital elephantiasis.

Definition.—The words of Milroy are most likely the best chosen definition: ". . . chronic hereditary edema. . . . It is limited in extent. . . . It is not painful or tender and without constitutional symptoms. It arises from no apparent cause. . . ." To specify more closely, the word "congenital" could be added.

Incidence.—The condition seems extremely rare. I do not believe that more than fifty families can be found in the literature. The report of Allen and Ghormley[10] gave proof of the rarity. Following some very excellent reports[6, 9] on several generations, the hereditary tendency seems to be proved. Although in our cases it could not be proved definitely that members of the older generation had the condition, the incidence in two siblings of the same generation proved the hereditary tendency.

Etiology.—The etiology seems to be entirely unknown and several theories have been formed. Congenital malformation of the lymph vessels is widely accepted. The article of Bloom,[14] basing his theory of hereditary malformation on the simultaneous occurrence of other deformities, seems to support this theory. One must not forget, however, the frequent mentioning of acute inflammatory attacks in his article, which, in turn is not characteristic for Milroy's disease. Rosenberg[13] described cases with other familial malformations, as polydactylism and strabismus. Other possible causes of the condition are vasomotor disturbances, venous or lymphatic obstruction, or thrombosis.

Symptoms.—The condition consists of a firm, pitting edema, affecting part or the whole leg, or both legs, and never extending above Poupart's ligament. There usually are no pains or attacks or signs of inflammation and no constitutional symptoms. The skin appears to be physiologic in color and temperature. The single case of Herzberg[11] reported on the upper extremity and other cases with acute attacks of inflammation, pains and redness are either misdiagnosed cases of inflammatory edema, coincidental conditions, or exceptional cases, like our Case 1, which showed edema of the prepuce in addition to the leg condition.

Laboratory Findings.—Blood chemistry and counts are within physiologic limits, as is the urine. The basal metabolic rate is zero or slightly below. The Aldrich-McClure test is equal on the affected and unaffected extremities. X-ray pictures of bones are physiologic. The pictures of the soft tissues show swelling and increased trabeculation of the subcutaneous tissues with radial arrangement of the trabeculae. The occa-

sional occurrence of spina bifida occulta is not significant since careful examination of large numbers of x-ray pictures of healthy individuals shows the same condition.

Pathology.—No autopsy report is available, but the few biopsies reported in the literature reveal enlarged spaces which may be lymphatics, and increase of fibrotic tissue (references 7 and 8 and our own histologic report of the prepuce of Case 1).

Course.—The course is chronic and progressive unless treated. With treatment the edema can be reduced but resumes previous dimensions soon after regular activity is taken up and compression of the limb discontinued.

Treatment.—Bandaging will reduce the swelling; it is, however, not very successful. The best results have been obtained with adhesive tape or pure rubber roller bandages.[10] Elastic bandages and stockings as well as Unna's paste boots have been tried.[21] The earlier the mechanical reduction of the edema is started, the better are the results. In later stages, progressive fibrosis reduces the compression effect. The operative procedures of the type of the Kondoleon operation or Sistrunk and other modifications have been successful in severe cases.[16, 17, 20, 21] Other surgical procedures are the insertion of silk, as reported by Handley[22] in 1908, or of celloidin, as reported by Beck[18] in 1942. Sympathectomy has been attempted but was considered valueless.[19]

CASE REPORTS

The family history of the two siblings, reported in this communication, was not conclusive. There were no known cases of congenital lymphedema. The mother's mother, however, had "peculiar ankles" and the mother's sister complained of swelling of her ankles when she was up and about for many hours during the day. Since we could not examine these persons, we could not present them in our report.

CASE 1.—G. D., born Jan. 5, 1940, white male child of French-German parentage, was seen at the outpatient department of the Milwaukee Children's Hospital, Aug. 29, 1940, at the age of 7½ months. The past history recorded a normal birth without incidence, and birth weight of 8 pounds and 2 ounces. The mother's prenatal period was uneventful except for a moderate anemia. Her blood Wassermann test was negative. The child was breast fed for three months and received cod-liver oil and orange juice as ordered by the physician. There were no past illnesses except an occasional cold. The mother was 23 and the father 21 years old at that time and both were in good health. The complaint was that "the child had a peculiar formation of both feet since birth with a swelling of the right lower leg and an enlargement of the penis." The physical examination at that time was essentially negative except for the above finding. The child was referred to the orthopedic clinic where the same condition was described and x-ray pictures of the spine and lower extremities were taken. No bone pathology was found except a spina bifida occulta of the second sacral segment which was not considered out of the ordinary. From here the child was referred to the urological outpatient department, where an edematous foreskin but otherwise nor-

mal penis was diagnosed, and circumcision was advised for the patient. On October 26, the child was admitted to the Milwaukee Children's Hospital. The physical examination was again negative except for the edema of both feet and both lower legs with accentuation of the right side. The edema was described as pitting.

Laboratory Work.—The urinalysis was essentially negative. The blood count was within normal limits; blood chlorides, 506 mg. per cent; nonprotein nitrogen, 30 and 32 mg. per cent; cholesterol, 191 mg. per cent; serum protein, 3.3 Gm. at one test and 4.6 Gm. at another; albumin, 2.9; globulin, 1.7; and the albumin-globulin ratio 1.7:1. The Kline test and the Mantoux skin test were both negative. A wheal absorption test was made and found to be 30 minutes on each foot. A few days later a comparative absorption test was made and the time found to be 40 minutes for the arms and 30 minutes for the legs.

Fig. 1 (Case 1).—G. D., at 3½ years of age. This picture was taken shortly after removal of elastic bandages. Note pressure folds.

Circumcision was performed in the usual manner. The foreskin was separated where it appeared to be normal. There was no bleeding encountered on the edematous part and the cut surface appeared white and tough. As the knife entered normal tissue profuse bleeding was noticed.

Microscopic Examination.—The examination of the specimen by the surgical pathological service of the Milwaukee Children's Hospital showed a markedly thickened and edematous foreskin. The subcutaneous tissue was translucent. The edema did not decrease after the removal of the foreskin. Microscopic examination of the foreskin revealed very dense collagen fibers. There were numerous thick-walled structures of capillary size, apparently lymphatics, since the walls contained no muscle.

The child made an uneventful recovery, the temperature was never elevated except one day postoperatively. He was discharged and ordered to return to the clinic for follow-up studies. The patient returned to the outpatient department for minor complaints such as "colds." Elevation of the legs and application of elastic bandages were ordered for the edematous extremities with temporary or no effect.

On July 3, 1943, the patient's sister (Case 2) was admitted to the hospital for herniorrhaphy and on examination revealed a similar swelling of the legs. At this time the diagnosis of Milroy's disease was made. At the next clinic visit the condition of our patient (Case 1) was also diagnosed as Milroy's disease. Elastoplast bandages were applied and reapplied since then without satisfactory results. The last treatment attempted was the application of Unna boots, for which the

Fig. 2 (Case 2).—G. B., at 2 years of age. This picture was taken shortly after removal of elastic bandages. Note pressure folds.

patient was admitted to the hospital Jan. 12, 1944. In preparation, the feet were elevated and elastic bandages snugly applied twenty-four hours before the boots. On February 3, the Unna boots were removed and reapplied; the reaction of the swelling was only questionable. On March 16, the patient was seen in the clinic and some slight, rather insignificant improvement noticed.

CASE 2.—G. B., white female, sister of G. D. (Case 1), was admitted Nov. 27, 1942, at the age of 17 months (birth date, June 12, 1941). Her past history was uneventful. She was a full-term child, weighing 8 pounds, 6½ ounces at birth. She received cod-liver oil and orange juice and apparently developed normally. The complaint on admission was cough and fever and the diagnosis of pneumonia was made and proved by x-ray picture. The mother remarked that the child had

a swelling of the right foot and leg since birth. This swelling changed in size at different times. The child was treated with sulfadiazine and was afebrile on the third day. On the sixth day after admission the administration of sulfadiazine was discontinued. The following day a left otitis media with temperature elevation was found. The patient made an uneventful recovery after myringotomy.

Laboratory Work.—The Kline test was negative. Nonprotein nitrogen, 28.3 mg. per cent; blood calcium, 10.1 mg. per cent; phosphorus, 6.25 mg. per cent; phosphatase, 4.0 units; total serum protein, 6.0 Gm. The urinalysis was essentially negative except for occasional appearance of traces of albumin and some sulfa-crystals. Urinalyses were made on five different days. Blood counts showed the expected leucocytosis associated with acute inflammatory conditions and mild anemia.

The patient returned to the outpatient department and elastoplast bandages were applied to the right foot and leg without significant results.

On July 3, 1943, the child was admitted for repair of a right inguinal hernia at which time the diagnosis of Milroy's disease was made. The operation of the hernia had to be postponed until the twenty-fourth of the same month because of an upper respiratory infection. At that time the child was readmitted, operated on, and recovered uneventfully. At this admission x-ray pictures revealed normal bones and joints of both legs and feet. Later pictures of the spine showed a small spina bifida of the second sacral segment.

On Jan. 12, 1944, the patient was admitted for Unna boot application. The preparatory treatment was elevation of the feet and legs and snug application of elastic bandages for twenty-four hours. On Feb. 3, the Unna boots were removed in the outpatient department and reapplied. The improvement of the swelling was not considerable. At the last return visit on March 16, some decrease of the size of the leg and softening of the tissues was found. The parents, however, as well as we, are aware of the temporary value of this improvement.

SUMMARY

Two cases of Milroy's disease have been reported and short review of the literature has been written, analyzing and describing the condition.

The small number of cases reported in the literature and the lack of a satisfactory theory of the etiology and the absence of an effective treatment justify the publication of all available material.

The laboratory reports of our cases, all being within normal limits, substantiate the fact, that this is not a constitutional disorder.

The histologic examination of the foreskin of our patient (Case 1), proves the presence of definite tissue changes, ruling out the mere stasis of the lymphatic fluid or blood.

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ABNORMAL ORIGIN OF THE LEFT CORONARY ARTERY WITH EXTENSIVE CARDIAC CHANGES IN A FEMALE CHILD THIRTEEN MONTHS OLD

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ABNORMAL origin of the left coronary artery with cardiac hypertrophy and extensive myocardial fibrosis of the left ventricle is an unusual condition. L. A. Soloff[16] recently reviewed the literature on these rare anomalies and reported a new case, bringing the total number published, not including ours, to seventeen cases.

CASE REPORT

D. L. C., a female baby, first seen at the age of 13 months, was born at full term. Labor and delivery were uncomplicated. The mother, a primipara, had considerable difficulty throughout pregnancy and was confined to bed most of the time because of signs and symptoms which suggested eclampsia. The child had a number of attacks of high fever with coughing and occasional wheezing since birth, which were diagnosed as bronchitis by several physicians. At the age of 5 months another physician diagnosed the condition as bronchopneumonia. The mother reported that the child's appetite had been poor "ever since she was 2 or 3 months old," and that she had refused almost all food other than milk. She had had no immunizations and was never given cod-liver oil, orange juice, or vitamin concentrates. At the time of admission to the hospital the child had suffered from high fever, vomiting, and grunting respirations for almost twenty-four hours. There had been no convulsions, diarrhea, or exposure to communicable disease and no history of having aspirated a foreign body. The mother thought that a simple head cold had existed for several days prior to the onset of the present illness. The mother stressed that until the day prior to admission, the child had been in as good a general condition "as ever."

Physical Examination.—Physical examination showed a well-developed and adequately nourished 13-month-old baby of somewhat grayish color. The respiratory rate was approximately 40 with a slight expiratory grunt. The pulse was 110 and of good quality. The rectal temperature was 103.2° F. Remainder of the physical examination was essentially negative with the exception of the chest.

The left side of the chest was splinted especially in the lower portion. Movements of the right chest appeared exaggerated. No retraction or bulging of the intercostal spaces was noted; no retraction in the suprasternal or infrasternal area could be seen. The lower three-fourths of the left chest was flat to percussion anteriorly, laterally, and posteriorly. Breath sounds in these areas were very distant with an occasional slight crepitant râle. The upper one-fourth of the left chest was resonant with normal breath sounds and a moderate number of moist, coarse râles. The right lung was resonant throughout; the vesicular breath sounds were intensive enough to suggest hyperventilation.

The apex impulse was barely palpable in the fifth interspace at least 1 cm. to the left of the mid-clavicular line. Percussion of the heart to the left was diffi-

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cult because of poor resonance of the surrounding lung tissue. The heart sounds were of normal intensity; there were no murmurs. The rhythm was regular, and the rate coincided with the pulse.

Impression on Admission.—At the time of admission findings suggested an acute pneumonic process, of the left lower lobe.

Therapy.—Fifteen grains of sulfadiazine were given on admission and two hours later 7.7 grains, administered every six hours thereafter. Normal saline, 150 c.c., was given subcutaneously, a humidifier was placed in the room, light sedation was ordered as needed, and high caloric fluids were to be encouraged.

Four hours after admission the child seemed much improved. She apparently felt fairly happy and became playful. Temperature was 101.4° F. rectally. Ten hours after admission temperature had dropped to 99.0° F., and fourteen hours after admission the nurse charted that the "child does not look sick." Approximately fifteen hours after admission the baby expired suddenly and unexpectedly.

Laboratory and x-ray examinations had been ordered but were not made because of lack of time.

Clinical History.—Summarizing the clinical history, it can be stated that this 13-month-old female infant had had several episodes of coughing and fever at varying intervals since birth. The present illness allegedly dated back to the day preceding admission, or less than twenty-four hours and was characterized by vomiting, cough, and fever. The findings suggested a left lower lobe pneumonia, and treatment appeared to be successful for several hours. Fifteen hours after admission the child was found dead in bed.

Post-Mortem Examination.—The post-mortem examination was performed four hours after death and revealed the following: The body was that of a well-developed and well-nourished female baby of approximately 13 months. The skin was smooth and pale grayish white in color. The abdominal organs were in normal relation. On opening the thoracic cavity two-thirds of the left pleural cavity appeared to be occupied by the greatly enlarged heart with only the apex of the left lung visible. The left pulmonary cavity contained about 100 c.c. of a cloudy yellow fluid. The lower lobe of the left lung was completely atelectatic. The upper lobe was slightly crepitant throughout. Aside from the greatly enlarged heart, the empyema of the left pleural cavity, and the atelectasis of the lower lobe of the left lung, nothing remarkable was noted.

The pericardium, in situ, was extremely distended and contained about 30 c.c. of a clear yellow fluid. The size of the heart was 11.5 by 7.5 cm., and the weight was 180 Gm. Normal weight at this age is about 42 Gm. The parietal and visceral pericardium were smooth and glistening. The visceral pericardium was moderately thickened over the lower anterior aspect of the left ventricle. The coronary vessels were small, grayish-white, and collapsed. The ventricles and atria were filled with soft, coagulated blood. The left ventricle was greatly dilated and balloon-shaped. The apex was formed entirely by the left ventricle. The interventricular septum was displaced toward the right ventricle. The right ventricle was relatively small. Both atria were moderately dilated.

The endocardium of the left ventricle was moderately thickened, opaque, and milky white. The circumference of the mitral valve was 4.5 cm. and of the aortic valve, 3 cm. The columnae carneae were flattened. The papillary muscles of the mitral valve were elongated and covered with thickened endocardium. Both mitral and aortic valves were smooth, gray white, and slightly thickened. The endocardium of the left atrium was moderately thickened and milky white. The endocardium of the right ventricle and atrium was thin and transparent. The circumference of the tricuspid valve was 4.0 cm.; that of the pulmonary valve, 3.5 cm. The foramen ovale was closed. The ductus arteriosus was completely obliterated.

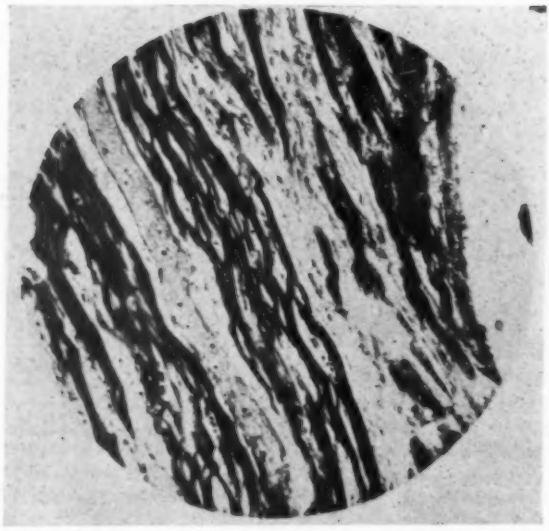

Fig. 1.—Myocardium, left ventricle. Atrophic muscle fibers separated by thin-walled capillaries.

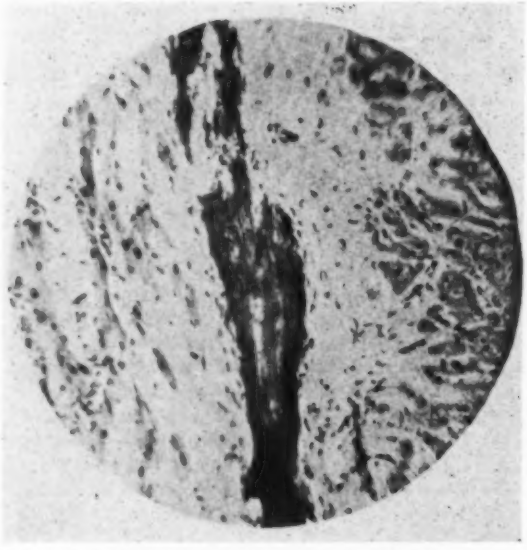

Fig. 2.—Myocardium, left ventricle. Scar tissue with calcified muscle fibers.

Fig. 3.—Myocardium, left ventricle. Embryonic sinusoids.

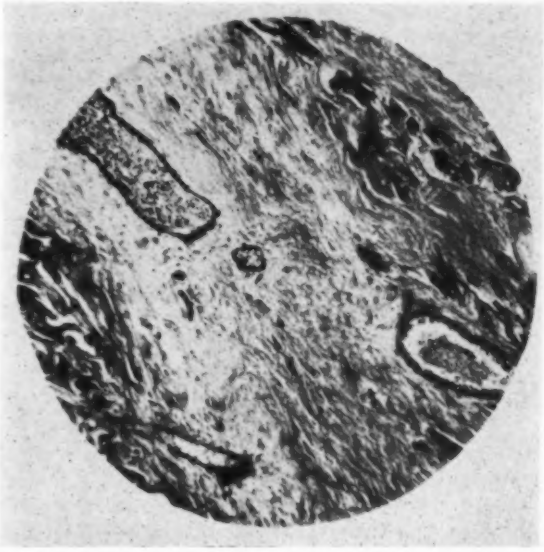

Fig. 4.—Myocardium, left ventricle. Extensive scarification.

The right coronary artery originated from the right sinus of Valsalva. Its orifice was approximately normal in size. The lumen of the artery was patent, and its branches were normal in distribution. No vessel originated from the left sinus of Valsalva. The left coronary artery originated from the left pulmonary artery, about 2 mm. above the valve; its ostium was about the size of a pin point. The left coronary artery represented the supply of the entire left ventricular muscle and faded into the apex. No anastomosis between the right and left coronary artery was demonstrable by dissection.

The myocardium of the left ventricle was firm, inelastic, pale, gray red and about 0.4 cm. thick.

Histological Findings.—The pericardium was moderately thickened and well vascularized. The capillary vessels were engorged with blood. There were empty, cleftlike spaces of considerable size (embryonic sinusoids) in the pericardium of the left ventricle which were lined with endothelial cells. Sections of the myocardium of the left ventricle at different levels revealed the following: Groups of muscle fibers beneath the pericardium contained vacuoles in the cytoplasm probably due to hydropic degeneration, as the fat stain was negative. The muscle fibers at deeper layers were atrophic, elongated, and tortuous; many were fragmented with indistinct striation. Fat stain revealed moderate fatty degeneration of groups of muscle fibers. The nuclei varied greatly in size and shape; many were pyknotic. The muscle fibers were either separated by thin-walled capillaries or strips of cellular or hyalinized, fine fibrillary, collagenous tissue. In many places the muscle fibers were completely replaced by large, irregularly shaped areas of fairly well-vascularized, fine fibrillary connective tissue. Remnants of fatty degenerated, necrotic, and calcified muscle fibers were noted. The muscle fibers of both auricles were fairly well preserved, with a moderate degree of fibrosis. The endocardium of the left ventricle and auricle was markedly thickened. A considerable number of small and large, cleftlike, empty spaces (embryonic sinusoids) were found throughout the myocardium, some occupying the entire low-power field. Occasionally they were surrounded by a broad layer of connective tissue containing numerous elastic fibers and lined with a layer of endothelial cells. The medium-sized arteries revealed definite perivascular fibrosis, with varying degrees of proliferation of the intima.

DISCUSSION

A comparison of the clinical picture with the results of the autopsy reveals that a pleural change was mistaken for a pulmonic change, an error which is commonly made in small children. However, the more remarkable fact is that the abnormal origin of the left coronary artery from the pulmonary artery and all the consequences of this condition escaped clinical observation.

Soloff[16] recently summarized the clinical findings which, in his opinion, should facilitate the diagnosis of this relatively rare occurrence. He believes that the presence of this anomaly in an apparently healthy child with a history of normal delivery is suggested by regurgitation of food, dyspnea, and often cyanosis, and that attacks of colicky pain with sweating and shock, which occur at first only while eating but later also during complete physical rest, complete the clinical picture. He emphasizes the fact that the diagnosis of pneumonia has often been erroneously made. The diagnosis, he states, could be confirmed by fluoroscopy and x-ray films, which would show an aneurysmal bulge of the left ventricle. Electrocardiography would show inversion of

the T wave in all leads. In our cases, however, the above-mentioned symptoms were never present. A study of the chart shows that the nurses who took care of this child during her brief period of observation experienced no difficulty in feeding her and did not consider her an extremely ill patient. Clinically there was no reason to suspect the anomaly found at autopsy. The question arises as to whether or not a longer period of observation would have led to the correct diagnosis.

The post-mortem examination showed that the marked dilatation and hypertrophy of the left ventricle had caused a compression of the lower lobe of the left lung as well as a shift to the right of the interventricular septum. This hypertrophy was histologically different from the so-called genuine hypertrophy in which an increase in muscle fibers of the myocardium occurs without degenerative changes. In our case far-reaching changes of the muscle fibers themselves were present, as well as their replacement by connective tissue to a varying degree and including calcification. The presence of this latter finding indicates a relatively long duration of the pathologic processes. We may be right to assume that the changes in the myocardium had begun before the birth of the child, even though our patient was older than any of the other infants with this anomaly. The fact that we found "embryonic sinusoids" in the myocardium, similar to those observed by Soloff in his 4½-month-old infant, would further indicate that an interference with normal development may have been present during the antenatal period. No definite reason for the persistence of these interesting structures is known. Perhaps they represent a compensatory mechanism to maintain the blood supply of an otherwise inadequately nour-

TABLE I

DISTRIBUTION OF REPORTED CASES AS TO AGE AND SEX

AUTHORS	AGE AND SEX OF CASES REPORTED				
	CHILDREN (MO.)			ADULTS (YR.)	
	BOYS	GIRLS	SEX UNKNOWN	MALE	FEMALE
Abrikossoff[1]		5			
Heitzmann[2]		3½			
Kiyokawa[3]			4		
Krumbhaar[4]		10			
Scholte[5]		2½			
Kockel[6]				38	
Ruebberdt[7]				27	
Barnard[8]		4½			
Abbott (D. Stephenson)[9]			3		
Abbott[9]					64
Bland, White and Garland[10]	3				
Linck[11]		8			
Dietrich[12]				53	
Chown and Schwalm[13]	5				
Bartsch and Smekal[14]	3				
Sanes and Kenny[15]		3			
Soloff[16]	4½				
Proescher and Baumann		13			

ished tissue. It appears that we are the first authors who have found "embryonic sinusoids" in the pericardium as well as in the myocardium.

Our case showed no evidence of aneurysm. It has been described on several occasions, but it is not always found. The question of why and how an aneurysm occurs in these cases cannot be answered at the present time.

Finally, we should like to call attention to the distribution as to age and sex of all reported cases of origin of the left coronary artery from the pulmonary artery, including our own (Table I). Disregarding the two infants of unknown sex, it appears that the number of female infants with this anomaly is twice that of the male infants (8:4). On the other hand, no conclusions can be drawn from the very small number of adult cases reported.

All authors appear to agree that the length of life of a patient with this condition depends upon the adequate development of collateral circulation supplying the left ventricle. It would seem that this circulatory adjustment is rare, because most patients with this anomaly die in their early youth. Of all infants reported ours was the oldest. The adult cases were seen in individuals who had been doing heavy physical work over a long period of time, and whose death was not caused directly by this anomaly. The finding of an aberrant coronary artery in these adults may therefore be considered coincidental.

SUMMARY

A case of abnormal origin of the left coronary artery found at autopsy in a 13-month-old female child is reported, bringing the total number of published cases to eighteen.

It appears that some patients do not present the clinical history which, according to a previous reviewer, would suggest the presence of this anomaly. The gross and microscopic changes in the heart are described in detail. Attention is called to our observation that the occurrence of this condition seems to be more frequent in female infants.

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EMIC Program

THE CHILDREN'S BUREAU, EMIC AND POSTWAR PLANNING FOR CHILD HEALTH

A STATEMENT

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FOREWORD

THE following statement has been prepared with the hope that it may bring better understanding of the intent and interests of the Children's Bureau in wartime services to children and in postwar planning.

The Children's Bureau is concerned primarily with the welfare and health of the nation's children. It has been given responsibility by Congress for investigating and reporting upon all matters pertaining to the welfare of children and child life among all classes of our people. Congress has entrusted it with the administration of the nation-wide program of grants to the States for maternal and child health and medical care of crippled children and for child welfare. Recently the Bureau's responsibilities in the field of maternal and child health were increased when the Congress appropriated funds for the Emergency Maternity and Infant Care program for the wives and infants of enlisted men.

The EMIC program is a wartime measure, utilizing existing services and methods of providing maternity care and medical care to infants; it will automatically come to an end six months after the war is over. Care authorized before the end of this six-month period will, of course, be carried to completion. It is not the purpose of the Children's Bureau to seek to carry over the EMIC program into the postwar period, for the Children's Bureau, too, as strongly as the Academy Board, would be "... unwilling to accept war emergency methods as the basis of a plan for the future practice of medicine and pediatrics in the United States,"* or for any postwar planning for maternal and child health.

It should be clearly understood, however, that it is the responsibility of the Children's Bureau, as well as of other agencies and organizations, to make recommendations as to the steps that should be taken in the postwar years to assure access by all families to adequate maternity care and health and medical care for children. It is the responsibility of Congress to decide the extent to which the Federal Government should participate in such a program and the policies governing such participation.

The Children's Bureau appreciates that the EMIC program as an emergency measure has faults resulting from the exigencies of war conditions. In its administration difficulties have occurred because of the pressures of wartime service, the unexpected and rapid expansion of the

*Editorial: J. PEDIAT., 25: 97, 1944.

program, the need to put a nation-wide emergency wartime program into effect within a few months' time with administrative machinery geared to peacetime activities and without adequate periods for advance planning.

Looking back upon the experience of the past eighteen months in the administration of this program, we recognize areas in which a better job could have been done had we had the advantage of this experience. It was fortunate that the Children's Bureau and the States had had the experience of handling the program of medical care for crippled children, even though small, for during the eight years of experience with this program many problems connected with hospital care and payment for medical services had been considered. It is apparent from the statements made by individual physicians and those which have appeared in several medical journals that there has not been a full understanding of the principles involved in the formulation of policies by the Children's Bureau for the administration of the EMIC program. A fuller interpretation of these principles and policies to the profession on the part of the Bureau undoubtedly would have been helpful and should have been made.

To have said in my address before the Maternity Center Association on the occasion of its twenty-fifth anniversary in April, 1943 (later quoted in an article published in the January, 1944, issue of *Parents' Magazine*), that "the start of this program marks a red-letter day for the United States, for it is truly a program of public maternity care, . . ." may have been an unnecessarily enthusiastic way of expressing our interest in the opportunity offered by EMIC to learn much about a public program of maternity and infant care even though a temporary one. It did not mean that I believed or wished that EMIC as such would be carried over to the peacetime period. It should have been reassuring to have the Chief of the Children's Bureau state, at a conference* held at the Children's Bureau on Dec. 10 and 11, 1943, in response to inquiries as to whether the Children's Bureau regarded the program as an emergency measure or one that would be continued after the war, that since the appropriations made by the Congress for emergency maternity and infant care were national-defense items, the Secretary of Labor in her regulations governing allotments of these funds had specified that "the term 'emergency' refers to the period of the present war and six months following its termination," and that ". . . this program has never been presented to Congress, the Bureau of the Budget, or to anyone else by the officials of the Children's Bureau as anything but an emergency program, 'emergency' meaning the usual definition of the war period and six months following the termination of the war."

In carrying out its functions the Children's Bureau has always sought the help and advice of pediatricians. It is they who have taken a leading part in establishing and maintaining the standards of health and medical care that the Bureau seeks to make available to all children. In the postwar period when many problems related to the health of our children must be evaluated and ways found to meet them, the Children's Bureau will continue to look to pediatricians for the help that past experience has taught it to expect.

The Children's Bureau has no detailed blueprint for a postwar plan. In broad terms the general goals may be again stated as has been done

*For a report of conference, see J. A. M. A. 123: 1125.

many times in the past. Detailed planning cannot be put off, however, for the people are aware that the health needs of mothers and children have not been adequately met in the past. The Children's Bureau must give the leadership that the people ask of it, but the planning will not be well done or the results effective unless those who render the care, those who organize and administer it, and those who receive it act together. Under a later paragraph I shall point out the general lines of the recommendations that the Children's Bureau believes should be considered in a plan for postwar maternal and child-health service. Any detailed plans for children in the postwar period should be carefully formulated and widely discussed before they are crystallized into recommendations for legislation and should be of particular concern to the American Academy of Pediatrics as well as to many other professional organizations and citizen groups. In arriving at its recommendations, however, a Federal agency is bound to seek the advice and consider the ideas and recommendations of lay organizations and individual citizens.

There are a number of statements in the "preamble" to the report of the Special Committee on the EMIC Program issued by the Executive Board of the Academy of Pediatrics, published in the July, 1944, issue of the JOURNAL, that indicate misunderstanding or lack of information and that should be clarified. It is hoped that the following statement will clarify many points. It does not attempt to cover every detail.

THE LEGAL RESPONSIBILITIES OF THE CHILDREN'S BUREAU IN RELATION TO THE EMIC PROGRAM

In approving the initial State project for maternity care of the wives and children of servicemen, in making such action known to other States faced with the same problem of rendering care to wives who had settled near military establishments, and in providing the Congress with the evidence of need for the continuation and extension of this program, the Children's Bureau was acting under the authority of the Social Security Act, title V, part 1, and not that conferred upon it under the Act of 1912 creating the Children's Bureau, as is implied by the report of the Executive Board of the Academy. The Social Security Act authorizes grants to State health agencies that have submitted to and had approved by the Chief of the Children's Bureau plans for the extension and improvement of services for promoting the health of mothers and children. Under the provisions of parts 1 and 2 of this title, services and certain types of medical care (medical and surgical care of crippled children and demonstrations of maternity care) are rendered to mothers and children.

It is the sole purpose of the Children's Bureau to assist in improving the conditions surrounding the lives of children. This objective it pursues through its legally established authority to investigate and report on matters pertaining to the welfare of children, to administer funds for grants to States appropriated to it by the Congress under the Social Security Act, and to enforce the child-labor provisions of the Fair Labor Standards Act, as directed by the act. In carrying out its administrative functions, the Children's Bureau necessarily develops administrative policies within the framework of the mandate of Congress and in the light of the legislative history of the acts. The discussions held during hearings before committees of Congress (to be found in the printed reports of such hearings), the printed reports of Congressional committees, and the debates on the floor of the two Houses

of Congress (printed in the Congressional Record) form the basis of this legislative history. Legal and administrative interpretation of this record must be taken into consideration in the formulation of any administrative policy by the Children's Bureau.

The scope of the Bureau's activities has been broadened materially since it was created in 1912 and was given its first mandate. The broadening of the scope of its work has been in accordance with new authority given to the Bureau by action of Congress. Legislation placing responsibilities on the Children's Bureau in addition to those defined in the Act of 1912 creating the Bureau include the Child Labor Act of 1916,* the Maternity and Infancy Act of 1921,* the Social Security Act of 1935 as amended in 1939, and the Fair Labor Standards Act of 1938. The authority of the Children's Bureau to administer the EMIC program has been recognized by the Bureau of the Budget and by the Congress in successive appropriation acts specifying the purposes for which appropriations for EMIC were to be expanded. The regulations of the Secretary of Labor governing the allotments of funds to States for the EMIC program are published in the Federal Register and have the force of law. They instruct the Children's Bureau to abide by certain conditions outlined in the Social Security Act as amended, title V, part 1, that are applicable to EMIC. They define the duration of the program as for the duration of the war and six months thereafter.

THE ORIGIN AND EXTENSION OF EMIC

The EMIC program was first made possible as a nation-wide service on March 18, 1943, when approval was given to a special appropriation by Congress to carry forward services that had been begun under the provisions of the Social Security Act, title V, part 1. Committee reports and hearings when this appropriation was pending indicated that the Congress believed this program to be related to the authority granted under title V, part 1, of the Social Security Act.

The Children's Bureau acted on a recommendation of the Conference of State and Territorial Health Officers meeting in March, 1942, when it set aside $198,000 of the 1943 appropriation to meet specific requests of State health agencies for funds to provide maternity care for the wives of servicemen and care of their infants. The first request made by the Children's Bureau to the Bureau of the Budget in December, 1942, and to the Congress in February, 1943, for funds to carry forward these programs of care was based on the individual requests of twenty-seven State health officers for funds to carry forward existing programs through the remainder of the fiscal year and of sixteen others to initiate similar programs.†

At the time the first projects were initiated in the States the extent or urgency of the need in many communities was not fully appreciated either by the States or by the Children's Bureau. As the service in the military areas became known, many wives of servicemen sought the offered assistance and the State health agencies soon found themselves without funds to carry on. The urgency of the requests from State agencies made it imperative that the Children's Bureau fulfill its re-

*No longer in operation.

†Report of Hearings Before the Subcommittee of the Committee on Appropriations, House of Representatives on the First Deficiency Appropriation Bill for 1943, pp. 318 and 328.

sponsibility by seeking the advice of the Bureau of the Budget as to how sufficient funds could be made available to carry forward existing programs during the year and so give time for the Congress to consider what further steps it wished to take to evaluate and meet the need. After review of the evidence of need reported by State health agencies and of the legal basis for an additional appropriation, the Bureau of the Budget recommended to the President that the Congress be asked to appropriate an additional sum to carry through the fiscal year. In March, 1943, after full discussion with the Children's Bureau and publication of the testimony presented at the hearings, the Congress passed and the President signed the deficiency bill carrying the first EMIC item of $1,200,000 as an item of "national defense."

At this time it was agreed that the extent of need for the program was not known and that the only way to determine the need was to allow the twenty-seven States to carry on their programs and others to participate if they believed it necessary or desirable. In making the appropriation the Congress had two purposes: (1) To relieve the servicemen of worry as to how maternity care for their wives or care of their infants if sick would be made available and how the cost would be met, and (2) to provide a way for the States to make available whatever maternity and infant care was possible in the communities where the wives and infants were living regardless of legal residence. The Congress did not limit the benefits of the program to specific geographic areas where the need was grossly apparent nor to wives and infants of servicemen who were in serious financial need. Experience had already shown that the need for the program existed wherever the servicemen's wives were living. The Congress could not discriminate between areas near military establishments and other areas. From the start the Congress regarded it as a wartime benefit to which any wife or infant of an enlisted man in one of the four lowest pay grades was entitled, something to which the wife and infant had a right. This became increasingly apparent in the Congressional debates on the First Deficiency Appropriation Act of 1943, the Labor Department—Federal Security Agency Appropriation Act of 1944, and House Joint Resolution 159 making additional appropriations for EMIC in October, 1943, for the fiscal year 1941. Once the Congress had made it clear that it proposed to support the program, it was the duty of the Children's Bureau and the State health agencies to inform the people of the benefits provided.

PROGRESS IN THE ADMINISTRATION OF EMIC

Expansion of the EMIC program was necessarily very rapid if care was to be made available promptly to any wife who wished to apply for its benefits. In order that State agencies might know in advance the policies relating to fiscal control and minimum standards that the Children's Bureau would use in approving State EMIC plans, the Bureau issued instructions in March, 1943 (amended in April and later months), which were an expansion of those given to States in May, 1942, for a similar purpose in connection with projects under the Social Security Act. These instructions, later issued as "administrative policies," were necessarily detailed if delay in approving State plans was to be avoided. Study of these instructions and policies will show that the details relate to (1) the over-all necessity of living within the costs of service to be rendered as understood by the Congress when making

the appropriation; (2) minimum standards of care or service for which payment was to be made; and (3) general administrative matters, such as eligibility for care.

Good administration requires accurate encumbrance of funds case by case and accounting of expenditures, accurate recording of cases accepted for care, advance application and authorization of care to be rendered except in cases of emergency or when lack of information or misinformation makes it impossible, prompt reporting of services rendered, prompt payment of outstanding bills, and follow-up of all authorizations for care for which payment is overdue in order to release encumbered funds. For the State agencies to establish the administrative machinery to carry out these procedures in the face of a mounting load of applications for care, that was in itself overwhelming, required time and the adaptation of the staff to new kinds of work. The task was particularly difficult because no Federal funds were available until July, 1944, to provide for the additional personnel needed. What this mounting load meant is best shown by the number of cases accepted for care quarterly:

April to June, 1943	15,847
July to September, 1943	53,353
October to December, 1943	91,896
January to March, 1944	110,954
April to June, 1944	133,130
July, 1944	40,785
August, 1944	46,012
Total through August, 1944*	486,715

Currently 91 per cent of the total cases authorized are maternity cases and 9 per cent are sick infants. Approximately 86 per cent of maternity patients delivered have received hospital care, a figure that compares favorably with the proportion of hospital deliveries to total deliveries in 1942, that is, 68 per cent.

Of the total number of cases (440,703) accepted for care before July 31, 1944, all care had been completed and all bills paid for 176,311 cases. Of the 234,639 incomplete maternity cases, 227,789 had been accepted for care in the previous six months and relatively few could be expected to have been completed in the sense that six weeks' postpartum care would have been given and all bills paid. Experience shows that it takes from three to six weeks for physicians and hospitals to submit bills and State agencies to complete payment.

Statistical reports of cases accepted, completed, or closed without payment are made by all States each month to the Children's Bureau. Reports to the Children's Bureau also show funds expended or encumbered each month. The cost of completed maternity and infant cases is computed monthly and used as a basis for alloting funds for the next month or as a check on estimates by the States of funds that they will need to encumber to cover expected costs. The exact situation at any time with respect to cases and funds is, therefore, available to the Bureau of the Budget or the Congress.

A point has been made in the report of the Board that the proposals of some States to meet their local needs have not been approved by the

*The total is not the sum of the amounts reported because of corrections submitted by State agencies in the total count that are not yet available by months.

Children's Bureau. It is true that proposals of certain States to raise the fees for maternity care or for the medical care of sick children beyond the maximum established under the Bureau's policies or to pay extra for operative deliveries, and also certain proposals to undertake activities or services outside those provided for under the stated policies have not been approved by the Bureau. The necessity for the establishment by the Bureau of limits to fees to be paid has been discussed in various advisory-committee meetings and conferences, as well as in the Bureau of the Budget and Congressional committees. It has always been agreed that such limits should be established. Once such a principle is accepted, it becomes clear that proposals that would raise rates of payment beyond the maximum could not be accepted. Similarly, proposals from one State for activities outside the stated scope of the program cannot always be accepted, particularly if they involve substantial increases in the cost of services that would lead to total expenditures beyond the appropriation by Congress. The Children's Bureau as the administrative agency is responsible to Congress for keeping the program within the general limits understood by Congress when the appropriation was made.

CONSULTATION BY CHILDREN'S BUREAU WITH PHYSICIANS

The Children's Bureau has always sought the advice of physicians in carrying out its functions. In 1914, Dr. L. Emmett Holt and Dr. Samuel McC. Hamill gave advice and assistance in the preparation of the first edition of *Infant Care*. The first Pediatric Advisory Committee was appointed in 1919 and has served continuously since that time advising on the content of bulletins for parents. An Obstetric Advisory Committee was first appointed in 1926. Committees of physicians and other professional workers were appointed in 1935 to advise the Children's Bureau on the administration of the maternal and child-health and crippled children's programs under the Social Security Act.

The medical membership of the Advisory Committees on Maternal and Child Health and Services for Crippled Children have always included physicians in private practice as well as those engaged in teaching, and public health and hospital administrators. In the fall of 1943 the proportion of practicing pediatricians and obstetricians on the maternal and child-health committee was increased on the advice of the committee itself, and several general practitioners were added.

The Children's Bureau has been criticized for not consulting more fully with physicians before approaching the Congress with requests for additional appropriations for the EMIC program. It has been the custom of the Bureau to call meetings of these Advisory Committees on Maternal and Child Health and Services for Crippled Children annually since 1935 when the Social Security Act was passed; in some years, more often. At these meetings many and various clinical and administrative matters have been discussed and recommendations have been made to the Children's Bureau. The questions covered have included need for maternal and child-health and crippled children's services, the basis of an adequate service, standards of medical and hospital care and qualifications of personnel, methods of financing payments to practicing physicians and hospitals, and many topics germane to the administration and efficient operation of the maternity-care and child-health and crippled children's services. Standards for a community program of maternity care and for medical care for children in a community were

discussed in detail and recommended at a special meeting held Sept. 9, 1939. At the meetings of these committees in December, 1940, and December, 1941, many problems related to the war were discussed, as well as the long-time maternal and child-health and crippled children's programs and the need for their extension.

In December, 1942, the usual meeting of the Advisory Committee on Maternal and Child Health was postponed until decisions could be reached by the Bureau of the Budget and Congress in regard to a deficiency appropriation to meet the requests of a number of State health agencies for additional funds to carry forward their programs of maternity and infant care for the wives and infants of enlisted men. Until the First Deficiency Bill for 1943, which carried the first appropriation for EMIC, had been agreed to by both Houses of Congress and approved by the President and until the full intent of Congress as to the purposes for which the appropriation could be spent was clarified in hearings and debate, the Children's Bureau was not in a position to discuss policies of administration profitably with either the advisory committee or the State health officers.

The annual conference of State and Territorial health officers with the Children's Bureau had been set previously for March 25, 1943. Immediately following the approval of the deficiency bill a request for a meeting of State maternal and child-health directors was sent to the State health officers and on March 29, 1943, a call for a meeting of the medical and public-health members of the Advisory Committee on Maternal and Child Health was issued. On March 23, 1943, twenty-three State maternal and child-health directors and several of the State health officers met with the staff of the Children's Bureau to discuss in detail the proposed administrative policies; on March 25, 1943, the usual annual conference of the State and Territorial health officers was held with the Children's Bureau.

On April 6, 1943, the Advisory Committee on Maternal and Child Health met and discussed the program and proposed policies with the staff of the Children's Bureau. There were present at this meeting the following members of this committee:

Dr. Fred L. Adair
Dr. W. W. Bauer
Dr. M. Edward Davis
Dr. Wilburt C. Davison
Dr. Robert L. DeNormandie
Dr. Nicholson J. Eastman
Dr. Clifford G. Grulee
Dr. Henry F. Helmholz
Dr. George W. Kosmak
Dr. Joseph I. Linde
Dr. E. D. Plass
Dr. Grover F. Powers
Dr. Philip F. Williams

The following were invited but did not attend: Dr. S. Josephine Baker, Dr. Norman F. Miller, Dr. Alice N. Pickett, Dr. Nathan Sinai, Dr. Felix J. Underwood, Dr. Joseph S. Wall, and Dr. C.-E. A. Winslow. Representatives of the staff of the U. S. Public Health Service and the Social Security Board also attended this meeting as advisors.

On Oct. 4, 1943, a meeting of the Nursing Advisory Committee was held to discuss, among other subjects, the EMIC program. A second meeting of the medical members of the Advisory Committee on Maternal and Child Health was held on Oct. 21, 1943, to consider revised policies for the EMIC program.

RELATIONSHIPS WITH THE ACADEMY CONCERNING THE EMIC PROGRAM*

Soon after the meeting of the Executive Board of the Academy of Pediatrics on Nov. 6, 1943, Dr. Wall reported to me the discussions with regard to the EMIC program and the resolution adopted by the Board requesting the Children's Board to call a conference of official representatives of the servicemen and of certain medical associations. To discuss the purpose of the proposed conference and some of the Bureau's policies that were not understood by the Board a meeting of a number of Board members and State chairmen was held at my request on Nov. 15, 1943, at the time of the meeting of Region III of the Academy in Cincinnati. The discussion centered around such issues as the modification of the program to provide cash grants to wives and proposals to allow physicians and hospitals to make supplemental charges above the amounts paid by the State agencies. The position taken by Congress with respect to cash grants was explained. The use of local child-health conferences and the provision of health supervision in physicians' offices were discussed. A proposal for payment of pediatricians on an annual basis for health supervision of infants in their offices was made by Dr. Wall. Explanation was made as to why it was not possible to add the cost of health supervision in the pediatrician's office to the program until the financial situation could be cleared in connection with the next appropriation. It was agreed at this meeting that the Children's Bureau would call the conference requested by the Board in its resolution as soon as feasible.

The resolution of the Board of the Academy of Pediatrics requesting a conference on EMIC specified that official representatives of the American Medical Association, the American Hospital Association, the U. S. Public Health Service, the American Association of Obstetricians and Gynecologists, and the American Academy of Pediatrics be included, as well as official representatives of the servicemen. Before deciding on the membership of this conference, I consulted Dr. Wall to determine what the Board meant by "official representatives of the servicemen." Dr. Wall suggested that the American Legion, the American Red Cross, the Army Emergency Relief, and the Navy Relief Society be included. After further discussion it was agreed that the branches of the armed forces concerned with allowances for the dependents of servicemen, namely, the War Department Dependency Board and the Bureau of Naval Personnel, should be added.

In addition to the medical organizations named in the Academy's resolution, the Children's Bureau on its own initiative invited representatives of the American Pediatric Society, the American Gynecological Society, the Committee of Physicians for the Improvement of Medical Care, and two representatives of the Association of State and Territorial Health Officers. Since matters of public policy in the administration of the program were to be discussed, such as the substitution of cash grants for a service program, the Bureau invited one representative from each of five national organizations of citizens that had supported the legislation, namely, the National Congress of

*In 1933, the Academy was asked by the Children's Bureau to name a member of the Bureau's Advisory Committee and Dr. Hamill was named and appointed. In 1936, he was replaced by Dr. Knox. In 1935, when the Advisory Committee on Maternal and Child Health was formed, the Secretary of Labor appointed Dr. Grulee as a member. This appointment was purposefully made because Dr. Grulee was Secretary of the Academy. Dr. Wall, as Chairman of the Academy's Committee on Legislation, was added in 1940. Many other members of the Academy have been members at one time or another.

Parents and Teachers, the General Federation of Women's Clubs, the National Women's Trade Union League, the Women's Christian Temperance Union, and the Young Women's Christian Association. Furthermore, since the conclusions of the conference would be matters for consideration by the Children's Bureau Advisory Committee on Maternal and Child-Health Services, the medical members of that committee were invited to be present.

Altogether of forty-eight persons attending the conference as members (including three guests brought by members), thirty-two were physicians and sixteen were nonmedical representatives of the American Hospital Association, the War and Navy Departments, the American Legion, the American Red Cross, the Army Emergency Relief, the Navy Relief Society, and the five national citizens' organizations.

That the meeting was not considered "utterly useless" (as the Executive Board of the Academy expressed it in its preamble to the special EMIC committee report) is shown by the resolution offered at the end of the conference by Dr. Wall as follows:

Whereas, the free expression of opinion during this conference from official representatives of all interested agencies has been of the greatest value in securing a better understanding and cooperation of those interested in the health and welfare of the wives and infants of the members of our armed forces and

Whereas, the Children's Bureau, a governmental agency, has wisely acceded to the request of the Academy of Pediatrics to call this initial conference with the official representatives of the professions actually rendering service under the EMIC plan and to consider the problems arising from the application of this plan, be it

Resolved, that it is the sense of this assembly, in view of the extraordinary benefits which have accrued by a meeting of those representing many thousands of servicemen, health professionals, and lay organizations, that future governmental conferences, national, State, and local, involving medical services, be similarly composed of the official representatives of the professions rendering these services and of the groups receiving them and thereby create in the public interest mutual confidence, cooperation, and good will between governmental and medical agencies.

Dr. Wall asked that the resolution be approved. His motion was seconded by Dr. Ashmun of Ohio. In discussing this resolution, Dr. Felix Underwood, President of the American Public Health Association and Health Officer of Mississippi, said:

"As a representative of the Association of State and Territorial Health Officers I wish to say for myself and for them that this is in keeping with the type of thought, consideration, and democracy that has been going on here in the Children's Bureau all along over the years.

"For a number of years the health officers in this country have been meeting with the Children's Bureau. I believe that the testimony would be universal among them that there has been fairness at all times, that the Children's Bureau can be trusted, that the Children's Bureau is fair, honest, and capable."

The resolution was unanimously adopted.

A report of this conference was published in the *Journal of the American Medical Association*, Dec. 25, 1943. The Children's Bureau is already planning for a second such conference in the late fall of 1944.

HEALTH SUPERVISION OF INFANTS UNDER EMIC

On Feb. 1 and 2, 1944, a special conference of pediatricians, State health officers, and maternal and child-health directors was called by the Children's Bureau to discuss child-health supervision, the value of child-health conferences, and the ways and means of providing health supervision of infants under EMIC. Sixteen of the twenty-six members of this conference were members of the Academy, including the president, the president-elect, the past president, and the secretary. A review of the recorded discussion shows that the following represents points of general agreement at the conference:

a. Child-health supervision is important and should be available to all children.

b. Many infants and children do not today have the benefit of health supervision. In broad terms the groups of children to whom it is not now available are the middle-income group in larger cities who cannot afford to go to private pediatricians, all children in many small communities where there are neither organized child-health conferences nor pediatricians, and many children in the war-congested areas.

c. The war has superimposed an added burden because of movement of families and shortage of physicians in many areas.

d. Child-health supervision covers a service the content of which is recognized and includes: protection against communicable diseases; a survey of the child's nutritional needs; a review of growth and development; examination for physical defects; and advice on feeding, physical and mental health, and behavior problems.

e. Child-health supervision may be given in child-health conferences or in the private offices of pediatricians or general practitioners.

f. Special training is required for this service.

g. Continuity in care and understanding of the home situation are important and may be provided by the physician or by a public-health nurse who visits the home.

h. Child-health conferences have an important educational function for groups of parents and for general practitioners, as well as a service function.

i. A qualified public-health nurse is essential to a good child-health conference.

j. The responsibility for planning to see that this service is available to all families rests with the health agencies.

No conclusions were reached as to the relative advantage of health supervision in a child-health conference or a physician's office, though the advantages of each type of service were presented. It was pointed out that there were not enough pediatricians to provide health supervision to two and one-half million new infants each year, that general practitioners could carry some proportion of the load, and that child-health conferences would be necessary to complete coverage for service and educational opportunities. The value of the service rendered by the public-health nurse in organized group teaching of mothers at child-health conferences, as well as through individual instruction, was emphasized by a number of members of the conference, and the contribution of nutritionist and dentist was also emphasized.

The second day of the conference was devoted to discussion of health supervision of infants under the EMIC program. Explanation was given that provision for payment for this service from EMIC funds had not yet been made because: (1) funds were not yet available to meet the cost, (2) the costs would depend on the methods advocated, and (3) no agreement had yet been reached as to the best method or methods. Discussion was invited on these aspects of the problem.

There was agreement that health supervision for the infants of servicemen should be provided, but there was much disagreement as to how it should be done. Some members advocated paying for health supervision given in pediatricians' offices; others felt this was impractical because pediatricians would not be able to handle the load; still others recommended that general practitioners be paid for this service. It was generally agreed that if provision were made for health supervision, each State should be allowed to provide the service best suited to that State. There was full discussion of methods of payment and the administrative problems involved, including payment on an annual basis.

The Children's Bureau agreed that it was anxious to find a way to provide this service and welcomed the proposal made at the conference that a special committee of the Academy be appointed to work with the Children's Bureau on the problems of child-health supervision.

Members of the Board who were present at the Children's Bureau conference on Feb. 1 and 2, 1944, and at the meeting of the Academy's committee on EMIC on June 9, 1944, know that the Children's Bureau had had specific proposals for health supervision of infants and differential rates of payment to specialists under consideration for some time and that it desired opportunity for consultation with the Academy's special committee before taking official action. They must also have been aware of the differences of opinion expressed by pediatricians with respect to how health supervision should or even could be rendered under wartime conditions and how varied were the ideas on how it should be paid for. The report of the Academy's committee on EMIC has been helpful to the Children's Bureau. It was used by a conference of State maternal and child-health directors on July 20 and 21, 1944, in drafting recommendations to the Children's Bureau for the establishment of policies on three phases of the EMIC program: (1) differential rates of payment to specialists, (2) individually adjusted payments for care of exceptional cases, and (3) health supervision of infants.

The Children's Bureau has recently issued amendments to its Administrative Policies dealing with these and other points. Under these amendments, at the option of the State agency—

(1) Differential rates of payment to specialists for care confined to their specialty may be provided for in State plans, if they do not exceed by more than 50 per cent the maximum rates adopted by the State agency for general practitioners and do not exceed the rates customarily paid to specialists.

(2) Provision may be made for adjusting, on an individual case basis, payments to physicians for extraordinarily severe cases that require an exceptional amount of care by the attending physician.

(3) Office medical care of infants, including immunizations, may be given at rates not to exceed $16 a year by physicians who are graduates of approved schools of medicine, and

(4) Health supervision of infants (including immunizations) may be provided from EMIC funds:

Through child-health conferences, provided maternal and child-health funds available under title V, part 1, of the Social Security Act are exhausted.

By purchase of service in child-health conferences conducted by voluntary agencies, at rates not to exceed $15 per year per child.

(5) Health supervision (including immunizations) and office medical care of infants when sick may be provided from EMIC funds:

In the offices of physicans qualified to render this service; that is, pediatricians with not less than one year of graduate training in this specialty, or by exception, physicians who because of experience in a child-health conference are considered qualified by the State health agency, at rates not to exceed $24 a year (unless the physician qualifies as a specialist, when the provisions of (1) above apply).

With respect to the use of EMIC funds for health supervision of infants other than those of servicemen, the Children's Bureau would like to have the record clear. None of the EMIC funds have been or will be used by the States to finance care of children or mothers other than those provided for under the Federal acts making appropriations for EMIC. Up to the present time no EMIC funds have been expended for child-health conferences. Even though under the recent amendments to its policies EMIC funds may now be used to provide health supervision in conferences, the policies state that this may be done only if funds for this purpose under the regular maternal and child-health program are exhausted.

CHILDREN'S BUREAU POLICIES REGARDING CHILD-HEALTH CONFERENCES

In discussing the EMIC program, the Board referred to a recent publication of the Children's Bureau on child-health conferences, *Maintaining Well-Baby Clinics in Every Community*, and the editorial discusses at length certain issues and principles involved.

The position taken by the Children's Bureau that child-health conferences established on a community basis should be available in all communities and open to any mother of the community without charge is not new. It is based on the principle that a child-health conference has a broad educational value, and is a potent force in the community toward improving the health of infants and young children and safeguarding their lives.

Education in the United States has for over one hundred years been looked upon as a right of every citizen. Believing that the life and health of its future citizens are just as important as their education, the Children's Bureau has taken the position that the child-health conference should be regarded as a service to which every mother should have free access if she wishes to avail herself of it. The Children's Bu-

reau believes that a mother should have the opportunity to decide whether she wishes to obtain her advice on infant and child care at such a conference or, if she can afford it, at the office of a private physician.

How knowledge of infant and child care will be made available to every family in the future, whether through group teaching as in the child-health conference, through instruction in a physician's office, or by other means is a matter to be worked out as progress is made toward providing more adequately for the health and medical care of all children. Whatever the future may have in store, the child-health conference is today the most vital and practical way of bringing knowledge of child care to the greatest number of American mothers. It must be recognized that the number of trained pediatricians is entirely inadequate to meet the need in their private offices.* Therefore, from the practical point of view of providing care to the greatest number of infants and children, the Children's Bureau has consistently advocated the use of the child-health conference.

The existence of child-health conferences in a community serves to create interest in and understanding of the purposes of child-health supervision. This in turn creates an interest among mothers to seek this service from the physicians who take care of their children when sick, especially if the mothers can continue to have the assistance of a public-health nurse in the home, and among physicians to provide health supervision to their patients.

In its recent publication, *Maintaining Well-Baby Clinics in Every Community*, it was not the intent of the Children's Bureau to claim that child-health conferences should provide health supervision for all preschool children in a community, or that the EMIC program would rely solely on such conferences for health supervision of infants. The position taken by the Bureau is that every community should have such conferences to serve as educational centers and provide opportunity for those families who wish this type of service or who are unable for various reasons to obtain it from private physicians. The EMIC program as a wartime measure coming at a time when there is a shortage of physicians in many communities must rely to a very considerable extent on community resources for group health supervision.

It was not the intention of the Children's Bureau to belittle in any way the medical service rendered to a mother and child in a physician's office, whether this was care of a sick child or supervision of a well child. It was, however, the purpose of the Bureau to point out that the public-health nurse in a child-health conference and in her home visits (and the nutritionist and dentist where these also participate in a conference)

*Distribution of population under 15 years of age and physicians who limit their practice to pediatrics:

SIZE OF PLACE	CHILDREN UNDER 15 YEARS (1940)		PEDIATRICIANS	
	NUMBER	PER CENT	NUMBER	PER CENT
Total	32,972,081	100.0	2,642	100.0
500,000 or more	4,441,450	13.5	1,007	38.1
100,000 to 499,999	3,232,271	9.8	719	27.2
10,000 to 99,999	5,474,312	16.6	821	31.1
2,500 to 9,999	2,797,114	8.5	73	2.8
Rural	17,026,934	51.6	22	0.8

Source: Population 1940 Census: Pediatricians, American Medical Directory, 1942.

adds something of very real value to the service that a mother receives at the conference which she does not get in the usual visit to a physician's office. In the preparation of the publication referred to, the statement with respect to the "service that the mother receives in a child-health conference" should have been expanded so that it could not be misinterpreted. This publication is not now being distributed and will be redrafted to make the position of the Bureau clear before reprints are ordered.

CASH ALLOWANCES VERSUS MEDICAL SERVICE

One of the most important parts of the report of the Academy's special committee on EMIC was the position the committee took with regard to the method of payment of EMIC funds.

The committee recognized that "direct payment to the physician was not an arbitrary ruling by the Children's Bureau but was the intent of Congress. . . ." Furthermore, in reaching the conclusion that ". . . from a practical standpoint the direct payment to the physician and hospital is the most feasible under an emergency war program," the committee supported the principle on which the Congress has acted in making appropriations, namely, that medical, nursing, and hospital care to the wives and infants of enlisted men should be provided through direct payment to those rendering such service. The footnote added by the Executive Board to the special committee's report tends to reverse this important part of the report.

Whether this principle should be maintained or whether a cash allowance or allotment should be substituted has been a major issue between organized medicine and the Congress. It came to a vote on the floor of the House of Representatives when that body was considering House Joint Resolution 159 providing a deficiency appropriation for EMIC in September, 1943. Cash allowances were rejected by an overwhelming majority of those voting.

The Children's Bureau has repeatedly stated its position as being opposed to changing the EMIC program from one of payment for service to one of cash allowances. Any form of cash allowance, whether a uniform grant or an allowance to the wife to pay a stated maximum amount toward her paid or unpaid bills, would defeat the purposes of the program—namely, to relieve the serviceman of anxiety as to how the cost of his wife's or infant's hospital and medical care will be met and to assure to the wife and infant whatever care can be made available. Experience shows that the cost of care frequently far exceeds average costs. Furthermore, unless the principle of payment for service is accepted, no assurance could be given that the public moneys would be spent for the purpose for which they are appropriated, nor could either quantity or quality of care, even at minimum levels, be assured.

POSTWAR PLANNING FOR CHILD HEALTH

With respect to planning for a postwar maternal and child-health program, it is not the purpose of the Children's Bureau to seek to carry over the EMIC program into the postwar period, but it is the responsibility of the Children's Bureau to bring together all available evidence of need for an expanded peacetime program of maternal and child health and to make recommendations as to the next steps that should be taken to reach more effectively all mothers and children to whom adequate maternity care or health and medical service to children are

not readily available. Whatever measures are proposed should assure nation-wide coverage within appropriate time limits of those health and medical services for mothers and children for which we have the skills and knowledge but have not provided the facilities and services. These measures should be so framed that they will ultimately fit into any general plan that may develop to provide hospitals and health centers and medical care. It is the responsibility of the Children's Bureau to make known information concerning the need for an expanded peacetime program of maternal and child health and its recommendations as to how the need should be met. Action to provide the resources that would make possible an adequate nation-wide maternal and child-health program is the responsibility of the Congress. Congressional action would be taken in accordance with the usual procedures, which include public hearings before committees established to handle substantive legislation.

Evidence of the need for an expanded program has been accumulating for many years. The war with its many dislocations of families and the rejection of nearly 50 per cent of the men examined for the armed forces has dramatically demonstrated the inadequacies of our basic provision for protecting the health, growth, and development of children. Progress has been made by the States and localities, but coverage of the country is far from complete for either services or facilities. We have the knowledge and skills in this country to protect the health and growth of our children. What we lack is the plan and resources to train sufficient physicians, nurses, and other professional and administrative personnel and to provide equipment and facilities to assure nation-wide coverage. Coverage for maternal and child health cannot be acquired overnight. Quality of care and service must be assured as well as quantity. The plan for maternity care and for health and medical service for children must fit into the total public-health and medical-care program, just as a pediatric or obstetric service in a hospital or clinic is a part of a general medical service.

To work out a plan for an expanded maternal and child-health program will require the combined efforts of those who must organize and administer such a program and those who would provide and receive the care. Once agreement is reached that an expanded program is needed for the protection and care of children, the steps necessary to block out a general plan and fill in details could be taken.

In the opinion of the Children's Bureau, if resources can be made available through an expansion of Federal grants-in-aid and State and local contributions, steps could be taken by the States in the near future to develop the maternal and child-health program in appropriate stages to assure access to proper care for all mothers during the maternity period, for all newborn infants, for preschool children, and for children during the school years and throughout adolescence.

Consideration should, therefore, be given at once to planning for appropriate expansion and organization of the necessary maternity services, child-health services and medical care for infants and preschool children, and health and medical services for school children. Particular attention should be given to the needs of crippled and handicapped children, including children with rheumatic disease. The Children's Bureau is of the opinion that the existing plan of Federal grants-in-aid to the States for maternal and child health and services for crippled children should be the basis for an expanded program.

To make such expansion possible, facilities must be constructed—health centers, hospitals, and convalescent centers. Some of these may be special facilities for maternity care or care of children. Most of them would be general facilities with proper provision for maternity and child care. Such a program must be made a part of an over-all plan for construction of health and medical facilities, but early attention should be given to providing for the needs of the maternal and child-health program.

At the same time there must be planning for expansion of training facilities to provide a rapidly increasing number of professional and administrative personnel. This will include training for pediatricians, obstetricians, and child psychiatrists in their specialties, for general practitioners, nurses, dentists, nutritionists, medical-social workers, and others in the basic principles and methods of care of children as applied to their specialties, and for administrators of the program.

In all of this, pediatricians will have a large part.

As I see it, the main objectives of the Children's Bureau and of the American Academy of Pediatrics, the American Pediatric Society, and other groups of pediatricians are the same. We are all concerned that the health, growth, and development of the Nation's children shall be the best we know how to obtain. In trying to reach our objectives we may disagree on certain issues, but that, in my opinion, should not mean that we cannot continue to work together to find the way to reach our common objectives.

The Pediatrician and the War

The following is a continuation list of the Fellows of the American Academy of Pediatrics on active duty in the Military Services:

Army

Dr. S. Gorham Babson, Portland, Oregon (First Lieutenant)
Dr. J. A. Wunderlich, Pittsburgh, Pa. (Captain)

Navy

Dr. Banice Feinberg, Providence, R. I. (Lieutenant Commander)
Dr. Wallace B. Taggart, Dayton, Ohio (Lieutenant Commander)

The following Fellows of the Academy in the Military Services have been promoted:

Army

Major Montgomery Blair, Jr., Washington, D. C., to Lieutenant Colonel
Captain Max Deutch, St. Louis, Mo., to Major
Captain Harvey F. Garrison, Jr., Jackson, Miss., to Major
First Lieutenant Victor Rudomanski, Kearny, N. J., to Captain
Major R. E. Williams, Chicago, Ill., to Lieutenant Colonel

Navy

Lieutenant Commander George L. Drennan, Jacksonville, Ill., to Commander
Lieutenant Commander Harold W. Dargeon, New York City, to Commander

United States Public Health Service

Captain S. J. Nichamin, Detroit, Mich., to Major

News and Notes

The deaths of the following Fellows have been reported to the JOURNAL:

Dr. Richard H. Blair, Hartford, Conn., August 14.

Dr. A. H. Fletcher, Danville, Ill., July 24.

Dr. Martin Ramon Arana, Buenos Aires, Argentina, July 22. Dr. Arana was Chairman of the Academy Scholarship Committee in Argentina and director of the Children's Hospital in Buenos Aires.

Dr. Victor Escardó y Anaya, Chairman of the Academy group in Uruguay, has been appointed Director of the Department of Health of the Instituto Internacional Americano de Proteccion a la Infancia.